State of Utah
Department of Agriculture
and Food

2002 State of Utah Ground-Water Program

By
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And
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ACKNOWLEDGMENTS

The Utah Department of Agriculture and Food's (UDAF's) 2002 Ground-Water Sampling Program is successful because of contributions made by many people. UDAF's ground-water steering committee consists of Commissioner Cary Peterson; Directors Randy Parker, Dick Wilson, and Dr. David Clark; and Section and Program leaders George Hopkin and Clark Burgess. This committee gives guidance, support, and direction to the program.

Efforts by members of the Utah Association of Conservation Districts (UACD) have also contributed greatly to the success of the 2002-sampling program. They helped select sampling sites and navigated us to locations of wells to be sampled. Their knowledge of local areas and contact with people who desired well sampling proves invaluable.

Terry Monroe, Jarred Manning, and Will Atkin of Utah Division of Water Rights (WR) helped in selection of well sites in the Pahvant and Curlew valleys.

This program has received excellent support from the UDAF Chemistry Laboratory Division, which performed sample analyses. The State Chemist, Dr. David Clark; staff chemists, Mohammed Sharaf, Cham Hoang, and Roxy Mabbutt and technical assistant Alba Fields provided prompt analysis of pesticide and inorganic samples collected during the year.

A critical part of the program is the collection, distribution, and maintenance of data. Anne M. Johnson, UDAF's GIS Coordinator, has been most helpful by efficiently producing GIS-based maps and giving suggestions for proper data management. Her work is exhibited throughout this report.

Virginia Sligting, secretary in The Division of Marketing and Conservation, has worked tirelessly in assembling, editing, and proofreading the report manuscript. Her careful work has insured a much more accurate document.

Finally, thanks are extended to the owners of wells without whose participation and trust this program would not have functioned.

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Front Cover: A windmill pump and well near Utah and Arizona border.

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Utah Department of Agriculture & Food
State Ground-Water Program
Report 2002

Utah Department of Agriculture and Food's (UDAF's) State Ground-Water Program is funded by the legislature to assist private well owners and other agencies, organizations and concerned citizens to have a better understanding of water quality. Provisions of the Federal Clean Water Act requiring drinking water testing exclude private wells used for drinking water, irrigation, and livestock watering even though these wells account for the majority of ground-water use in the State of Utah.

This report covers activities of UDAF's State Ground-Water Program for 2002.

Cooperative Effort

UDAF has a memorandum of understanding with the Utah Division of Water Rights (WR) for collecting ground-water data from Pahvant and Curlew valleys. Sample analyses were done for inorganic and organic constituents that influence water quality. Guidance from WR has helped in selecting sampling sites and sharing data.

UDAF also works closely with the Department of Environmental Quality (DEQ) in providing expertise for the State Pesticide Management Plan and other ground-water programs. This relationship benefits UDAF by allowing agriculture's voice to be heard and its ideas considered during the planning process. UDAF is an essential link between DEQ and farmers and ranchers of the state regarding environmental issues.

The State Ground-Water Program works with members of local Soil Conservation Districts (SCDs) and Utah Association of Conservation Districts (UACD) to identify private wells for sampling. SCD cooperation and knowledge of the local area has been very beneficial in identifying wells for sampling, meeting well owners, and distributing information. The work of local district members who advertise, collect names, and organize sampling events helps to make the program successful.

UDAF's Ground-Water Sampling Procedures

UDAF meets with SCDs to inform and update members on ground-water issues. Districts then select wells for sampling in their area and obtain preliminary sample information by using UDAF's Pre-Sample Information Form (Fig. 1). For Pahvant and Curlew valleys, WR selected wells to be sampled.

Local SCD members escorted UDAF personnel to selected well sites. At each well, location was determined using a Global Positioning System (GPS) receiver. Water was then collected for inorganic, bacteria, and pesticide analyses at each well using established protocol. Samples were packed in ice and taken to the laboratory for analysis. Reports summarizing laboratory results were sent to each well owner. GPS information was provided to UDAF's GIS administrator who provided maps of the sampled areas.

During 2002, UDAF tested all samples for coliform and E. coli bacteria using IDEXX Colilert MUG kits in the field. This has been a significant addition to the program. We also conducted nitrate testing in the laboratory using an enzyme procedure from Nitrate Elimination Company, Incorporated, located in Lake Linden, Michigan. We found this procedure to be more dependable and accurate than cadmium reduction procedures that we have used in the past.

Areas Sampled

During 2002, 325 samples were taken from wells, drains, and springs in all of the 7 UACD zones in the state. Each UACD district sampled is addressed in this report, with a map showing sample location and a table of chemical analyses. Narrative reports are also provided for each sampled district. Below is a general summary of ground-water quality for sampling during 2002 based on EPA standards.

Summary of Water Quality for 2002

There were no pesticide detections in the 325 samples taken during the 2002 sampling season based on EPA standards. Results show that water quality is diverse throughout the state with electrical conductivity (EC) ranging from 85 to 22,900 µmhos/cm with a mean of 1,111 µmhos/cm. Standards for EC are rendered as Total Dissolved Solids (TDS) for livestock watering and culinary use; for purposes of comparison, EC values are converted to TDS for these standards. TDS values are proportional to EC at a ratio of 3:5. Water having EC values exceeding 750 µmhos/cm may cause damage to sensitive plants when the water is used for irrigation. When EC exceeds 3,000 µmhos/cm severe damage to all but the most salt-tolerant plants is expected. One hundred and forty-five exceeded the 750 µmhos/cm level and 15 exceeded the 3,000 µmhos/cm level. The Federal Clean Water Act sets an aesthetic standard of 500 ppm (500 ppm TDS) for drinking water. Water that exceeds this level may have an objectionable flavor. One hundred and twenty-four samples exceeded this value. When EC exceeds 3,333 µmhos/cm (2,000 ppm TDS) it becomes a health issue. Thirteen samples exceeded this value. Since livestock have a much higher tolerance for saline water, the critical value for livestock watering is 8,333 µmhos/cm (5,000 ppm TDS). Only 2 samples exceeded this level.

Variation in water temperature also demonstrates the great diversity of ground water quality throughout the state. For samples collected in 2002, sampled water temperature ranges from just above freezing at 4.0 ºC to a high of 83.0 ºC. The average temperature was 15.6 ºC.

An important chemical characteristic of water is pH. Generally the groundwater in Utah is slightly alkaline, with a mean pH of 7.86. The range of pH for samples collected this year is 6.35 to 9.70. The value of pH can help estimate types of dissolved minerals and compounds likely to be found in the water. Water on either end of this range has characteristics that adversely affect water quality. A pH value less than 6.5 indicates the possible presence of heavy minerals, whereas a pH value greater than 9.0 may indicate the presence of excessive sodium.

Hardness of water is determined on the basis of how much calcium (Ca) and magnesium (Mg) are in the water. In Utah, Ca and Mg are plentiful in the soils and also in ground water. Hardness values based on grains per gram (gpg) of water range from 0.2 (soft) to 69.4 (very hard) with an average of 7.12 (hard). Soft water can have high sodium values and may not be fit for culinary use even though it is classified as “soft.”

Sodium (Na) affects water quality and soil in various ways. Na causes soil particles to separate, freeing organic matter. Soils with high Na levels appear as dark, slick waterlogged areas. These soils are not suitable for crop production because air and water cannot pass through them. The Sodium Absorption Ratio (SAR) indicates whether irrigation water is likely to degrade soils due to excess Na. When the SAR value reaches 3, soils may begin to degrade. When the SAR value reaches 9, damage is severe. SAR values for samples this year range from 0.06 to 91.4, with a mean of 2.81. Special irrigation practices are required when using water with a high SAR value.

As found in previous years, bacteria are a major problem for private water systems. Twenty-seven percent of the wells and springs sampled this year tested positive for coliform bacteria, as compared to 59% in 1999, 36% in 2000 and 29% in 2001. Although most coliform bacteria do not pose a health problem, their presence in well water indicates that surface waters, soil, or other contamination is getting into the well. Bacteria problems are usually seen in older wells, wells with improper casing and caps, wells that are too shallow or systems that have been improperly maintained. Of greater concern is the presence of E. coli in water samples. During 2002, 3.4% of the wells and springs sampled tested

positive for E. coli as compared to 34% in 1999, 7% in 2000 and 4% in 2001. These wells have been contaminated with mammalian fecal material, the only source for this bacterium. The source could be effluent from septic systems near the well, poor well construction with livestock near the well head, or open wells in areas where animals and manure are present.

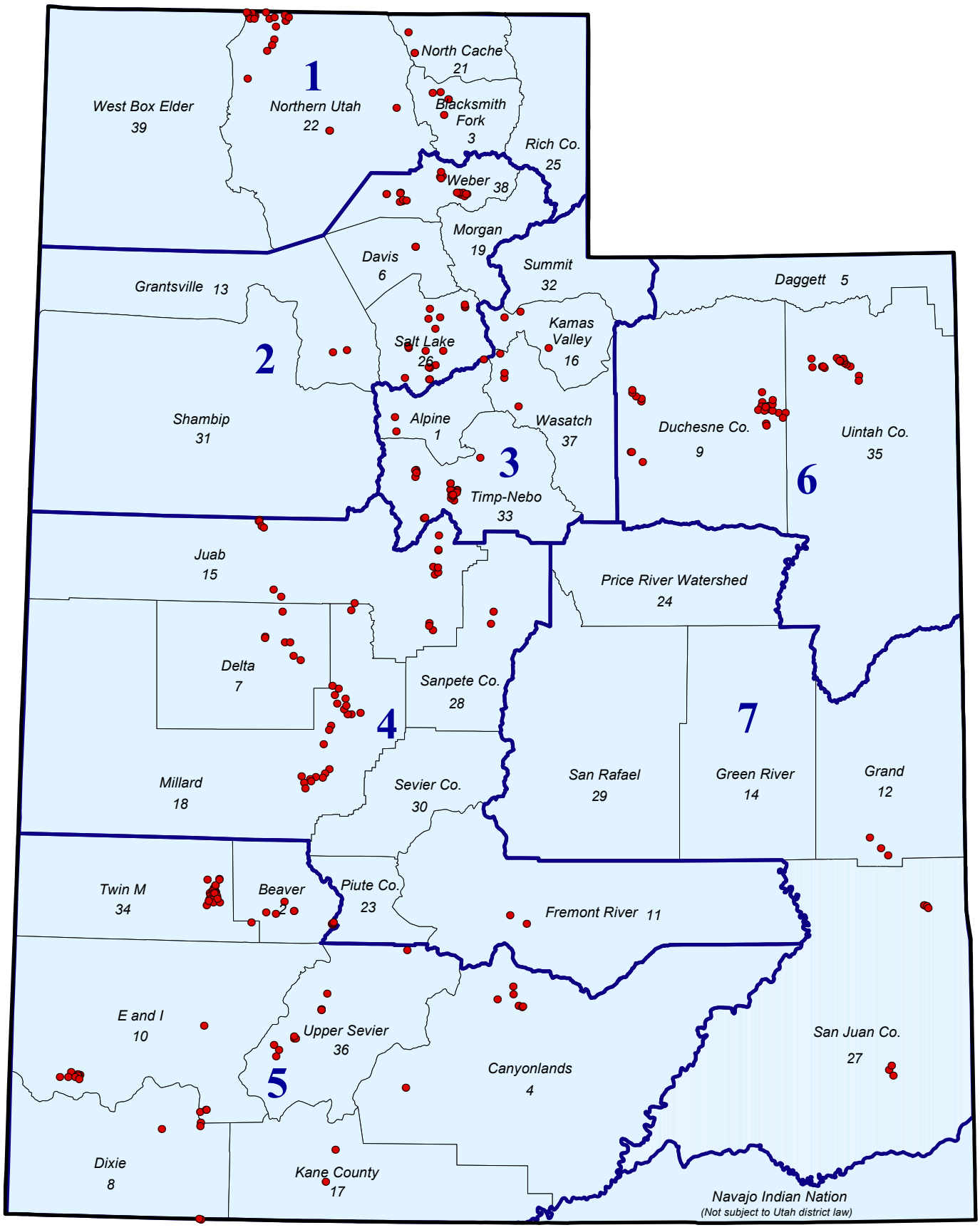
Specific elements that exceed irrigation, livestock, or drinking water standards are discussed in the area reports as described below.

More detailed descriptions of water quality for each sampled area are presented in this report. The report covers specific UACD zones and districts where sampling was conducted, and in some cases separate areas within districts are presented where circumstances warrant separate treatment. A map for each area is presented that shows sampling site locations. Tables of chemical, bacterial, and physical characteristics of sampled water are also presented. Measured values on the tables that exceed primary drinking water standards are shaded, whereas those exceeding secondary standards are underlined. Measured values that exceed livestock health standards are also shaded, and values that indicate minor animal health problems are underlined. Measured values that exceed irrigation standards are underlined, with levels in the severe range being shaded.

Sample site locations can be identified on the map using the “Id#” column from the associated table. Values of –0.1000 indicate that this element or compound was not measured above the detection limit of the procedure used to test for the element or compound.

Map 1.

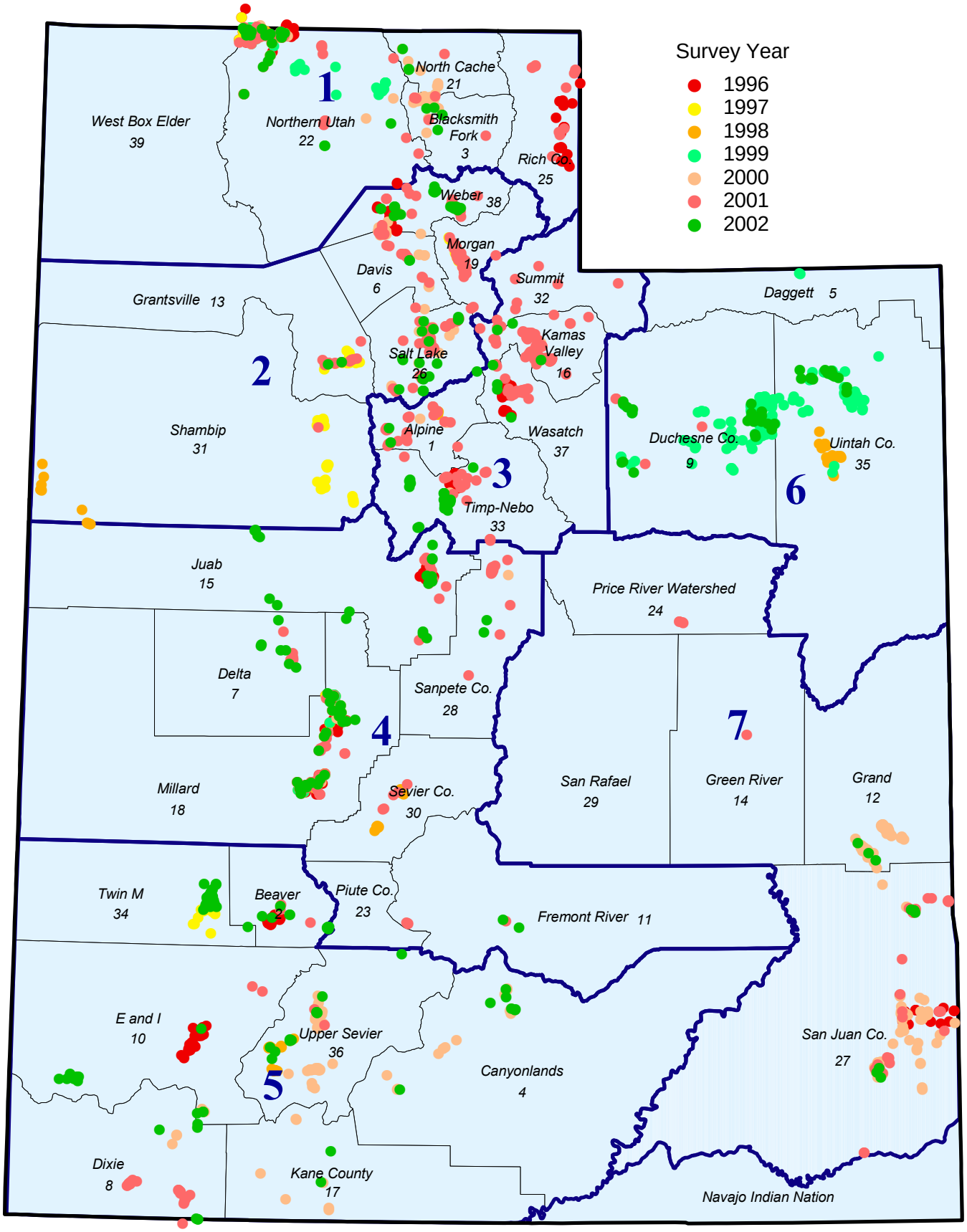
2002 Ground Water Sample Locations



UDAF GIS November 2002

Map 2.

Ground Water Sample Locations 1996-2002



UDAF PRE-SAMPLE INFORMATION FORM

(This is a non-regulatory program. Data from sampling this well will be for your use and information)

Name:_____ Water Right #:_____

Address:_____ Depth of Well:_____

City:_____ Depth of Water:_____

Telephone #:_____ Conservation District:_____

Please sketch a map showing how to locate your well (North is the top of the page.) Please give street name, and distances from major intersections or any other landmarks.

May we turn on your water or pump without you being present?_____

Are there instructions we need to sample your well?_____

_____

By signing this form you are giving permission for the State of Utah Department of Agriculture and Food to cross your property and sample your well.

I the undersigned am the lawful agent of the above described well and grant permission to the Sate of Utah Department of Agriculture and Food to sample said well. I also grant access permission to the well.

_____ _____

Sign on the above line Date

For any further information contact:

Mark Quilter, Ground-Water Specialist
UDAF, 350 North Redwood Road
Box 146500, Salt Lake City, UT 84114-6500
(801) 538-9905 Fax: (801) 538-9436

FIG. 1. Pre-Sample Information Form.

Zone 1

UACD Zone 1 consists of four districts in three counties comprising the northern tier of the state including Box Elder, Cache and Rich counties.

Thirty sites were sampled in three districts in Zone 1 during the spring, summer and fall of 2002. These included five sampled in the Blacksmith Fork District, three in the North Cache District and 22 in the Northern Utah District. A separate narrative report is presented for each district, with maps showing approximate locations of the sample sites. Each report covers three categories of water quality criteria: irrigation, livestock and culinary. Data are presented in four tables for each zone, grouped according to district—namely, general parameters (temperature, pH, total dissolved solids (TDS), and chemicals for which there are no standards); irrigation, livestock and drinking water parameters.

Blacksmith Fork District

Water sampled in the Blacksmith Fork District is moderate-hard with grains per gallon (gpg) ranging from 4.4 to 5.9, with a mean of 5.1gpg. Water temperature ranges from 12.8 ºC to 18.9 ºC, with a mean of 15.52 ºC. The pH for this area ranges from 7.6 to 7.8, with a mean of 7.69.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressure, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. No samples in this district exceed the 750 µmhos/cm standard.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected in this area have high bicarbonate, which is common for water in Utah.

No other elements were detected above concentration levels harmful to plants.

Livestock:

All of the tested water samples meet livestock quality standards.

Culinary:

Iron was found in sample 2209 to exceed the aesthetic drinking water quality standard. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Sample 2209 also has high manganese (Mn) concentrations. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

No samples from this district were found to have bacterial contamination.

Sample Site Test Data for Blacksmith Fork District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2202	-0.1000	69.03	1.44	-0.1000	27.72	10.16	-0.10	7.76	13.0	318
2203	-0.1000	71.67	1.52	-0.1000	29.19	9.91	-0.10	7.64	14.5	331.2
2204	-0.1000	57.58	2.05	-0.1000	21.35	9.96	-0.10	7.67	12.8	263.4
2205	-0.1000	58.35	1.31	-0.1000	21.96	8.79	-0.10	7.8	18.9	280.2
2209	-0.1000	54.49	7.86	-0.1000	20.83	15.44	-0.10	7.6	18.4	260.4

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2202	-0.1000	-0.10	7.56	-0.10	-0.1000	-0.1000	4.19	-0.1000	-0.1000	-0.10	0.3	530
2203	-0.1000	-0.10	8.82	-0.10	-0.1000	-0.1000	4.42	-0.1000	-0.1000	0.14	0.2	552
2204	-0.1000	-0.10	7.89	-0.10	-0.1000	-0.1000	3.90	-0.1000	-0.1000	0.06	0.3	439
2205	-0.1000	-0.10	7.63	-0.10	-0.1000	0.0463	4.04	-0.1000	-0.1000	0.06	0.2	467
2209	-0.1000	-0.10	11.51	-0.10	-0.1000	0.3851	4.11	0.1077	-0.1000	-0.10	0.5	434

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Blacksmith Fork District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2202	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.73	-0.1000	318	-0.1000	-0.10
2203	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	24.33	-0.1000	331	-0.1000	0.14
2204	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.73	-0.1000	263	-0.1000	0.06
2205	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.03	-0.1000	280	-0.1000	0.06
2209	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.87	-0.1000	260	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2202	-0.1000	0.0523	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.4	-0.1000	28.73	-0.1000	318	-0.10	7.76	0	0	5.7
2203	-0.1000	0.0526	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.0	-0.1000	24.33	-0.1000	331	0.14	7.64	0	0	5.9
2204	-0.1000	0.0579	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.6	-0.1000	12.73	-0.1000	263	0.06	7.67	0	0	4.6
2205	-0.1000	0.0535	-0.1000	-0.1000	-0.1000	0.0463	-0.1000	0.8	-0.1000	13.03	-0.1000	280	0.06	7.80	0	0	4.7
2209	-0.1000	0.1397	-0.1000	-0.1000	-0.1000	0.3851	0.1077	-0.1	-0.1000	9.87	-0.1000	260	-0.10	7.60	0	0	4.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

North Cache District

Water sampled in the North Cache District area tested moderate-hard to hard, with grains per gallon (gpg) readings from 3.9 to 8.4, with a mean of 5.48 gpg. Sampled water temperature ranges from 13.2 ºC to 14.6 ºC, with a mean of 14.0 ºC. The pH for the area ranges from 7.24 to 7.67, with a mean of 7.50.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2208 in this district exceeds the 750 µmhos/cm standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples collected in this district, have high bicarbonate levels, which is common for water in Utah.

No other elements were detected above concentrations that are harmful to plants.

Livestock:

All of the tested water samples meet livestock quality standards.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for 2208 exceeds the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

No samples from this district were found to have bacterial contamination.

Sample Site Test Data for North Cache District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2206	-0.1000	51.27	6.35	0.0535	16.05	52.29	-0.1	7.67	14.6	344.4
2207	-0.1000	53.12	6.32	0.0561	16.70	49.93	-0.1	7.6	14.2	345
2208	-0.1000	109.32	2.32	-0.1000	34.85	34.32	0.27852	7.24	13.2	511.8

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2206	-0.1000	0.09	37.90	-0.10	-0.1000	0.0782	3.74	-0.1000	-0.1000	-0.10	1.6	574
2207	-0.1000	0.09	38.30	-0.10	-0.1000	-0.1000	3.80	-0.1000	-0.1000	-0.10	1.5	575
2208	-0.1000	0.10	53.91	-0.10	0.0245	-0.1000	6.50	-0.1000	-0.1000	-0.10	0.7	853

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2206	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.76	-0.1000	344	-0.1000	-0.10
2207	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.08	-0.1000	345	-0.1000	-0.10
2208	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.46	-0.1000	512	-0.1000	-0.10

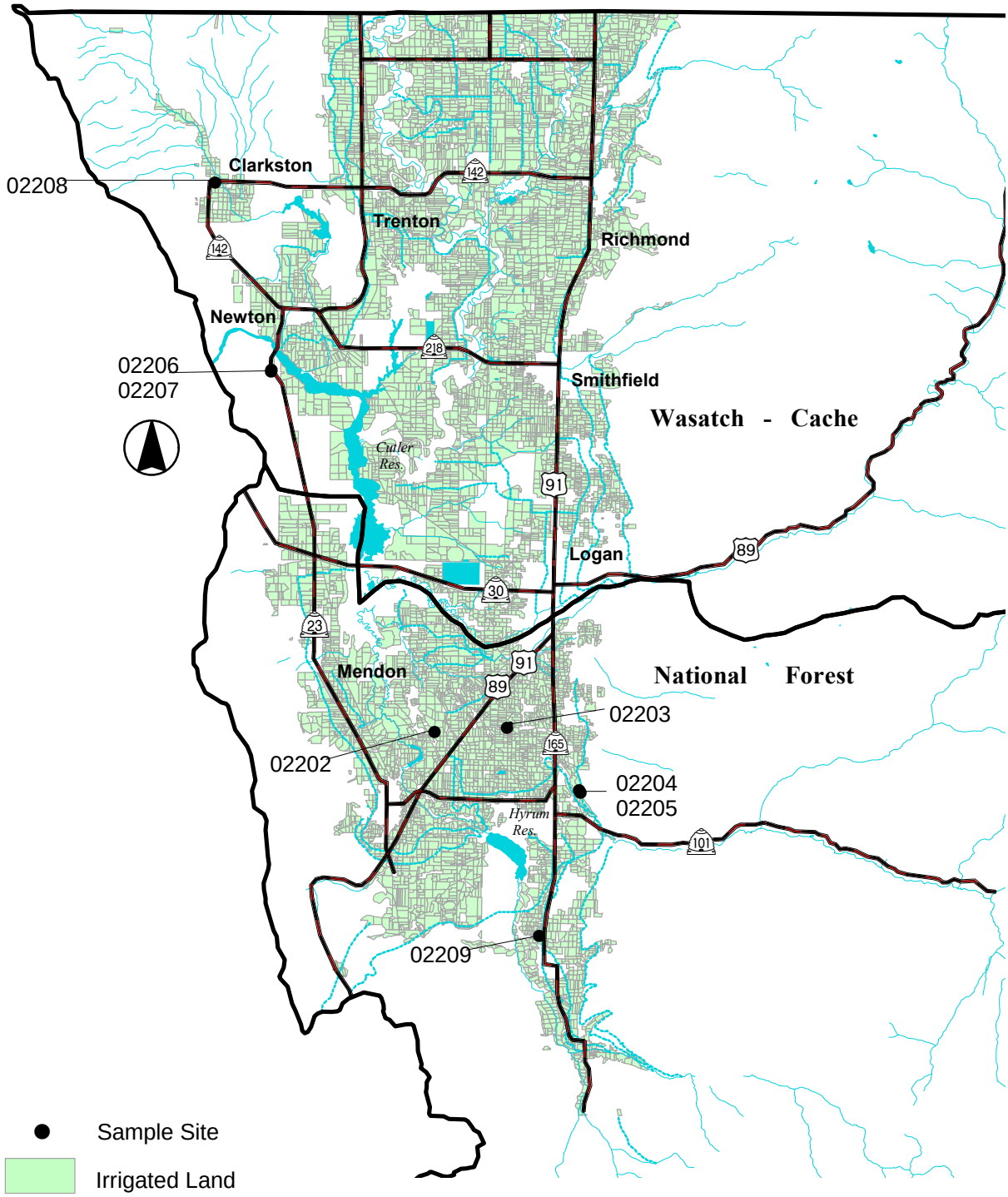
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2206	-0.1000	0.0220	-0.1000	-0.1000	-0.1000	0.0782	-0.1000	4.1	-0.1000	13.76	-0.1000	344	-0.1	7.67	0	0	3.9
2207	-0.1000	0.0245	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.3	-0.1000	14.08	-0.1000	345	-0.1	7.60	0	0	4.1
2208	-0.1000	0.0564	-0.1000	-0.1000	0.0245	-0.1000	-0.1000	9.1	-0.1000	12.46	-0.1000	512	-0.1	7.24	0	0	8.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 3. Blacksmith Fork and North Cache Districts



Sample Site

Irrigated Land

Water Body

SCD Boundary

Major Road

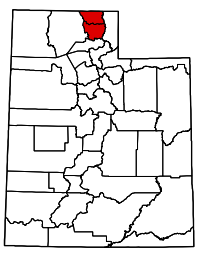
Other Road

Water Course

Ditch or Canal

Map Scale 1:313,986 (1 inch = 4.96 miles)

District Location



Northern Utah District

Water sampled in the Northern Utah District varies from soft to very hard, with grains per gallon (gpg) ranging from 1.2 to 36.3 with a mean of 13.3. Sampled water temperature ranges from 13.2 ºC to 24.2 ºC, with a mean of 18.53 ºC. The pH for the area ranges from 7.3 to 9.1, with a mean of 7.80.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Only two samples, 2273 and 2274, have EC values less than 750 µmhos/cm. Four samples exceed the severe-injury level of 3,000 µmhos/cm — 2262, 2263, 2264, and 2265.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Most water samples in this district, 2259 through 2269 and 2276 through 2309, have elevated SAR values. Samples 2262 through 2265, 2269, 2308, and 2309 exceed the severe level of 9.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected this year have high bicarbonate, which is common for water in Utah. Sample 2199 exceeds 8.5, the level above which severe problems appear.

Some specific elements can be toxic to plants. Sample 2262 has elevated boron (B), which is toxic to sensitive plants when it exceeds concentrations of 0.7 ppm. Boron causes severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating health from toxicity is small.

Chlorine (Cl), found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2259 through 2261, 2266, 2267, 2270 through 2272, and 2275 through 2309 have elevated Cl. Many of these samples also exceed the severe level, samples 2259, 2261, 2266, 2267, 2270, 2276, 2277 and 2308.

No other elements were detected in concentrations harmful to plants.

Livestock:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Livestock watering standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Values above 5,000 ppm are too high in salts for most livestock. Usually livestock will not drink water of this quality unless forced. Sample 2262 exceeds the salinity standard for livestock.

Samples 2262 and 2268 have sulfur (S) at concentrations of 197.99 ppm and 278.28 ppm respectively, which exceeds the livestock standard for sulfur. Sulfur in the form of sulfate can cause water to be off flavored and causes diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for all samples except 2273 and 2274 exceed the EPA aesthetic standard of 500 ppm. Above this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm. Samples 2262 through 2265 exceed the health standard for TDS.

Arsenic (As) exceeded the primary drinking water standard in sample 2262 with a value of 0.0630 ppm.

Copper (Cu) exceeded the primary drinking water standard in sample 2268 with a value of 2.59 ppm - eight times the standard of 0.05.

Sample 2260 has high iron (Fe). This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stains anything that it contacts. Again, this is an aesthetic issue, not a health concern.

Sample 2199 exceeds the EPA nitrate (NO_3) standard of 10 ppm nitrate expressed as nitrogen (NO_3-N). NO_3 is an important nutrient for plant growth. It is found in nitrogen fertilizers, manure, septic systems, and some minerals. NO_3 is toxic to young infants, usually less than 6 months of age and causes “blue baby syndrome.” NO_3 can only be removed from water by reverse osmosis or distillation.

Samples 2259, 2261 through 2264, 2266, and 2268 also have high sulfur (S). Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if its concentration is greater than 83 ppm sulfur. Bacteria in the water use sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Eight of the 22 samples tested positive for coliform bacteria. These include samples 2199, 2260, 2264, 2265, 2268, 2269, 2272, and 2273. Samples 2199 and 2260 tested positive for E. coli. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Northern Utah District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2199	0.1790	68.2040	35.6787	0.1009	86.3362	60.03	-0.1000	7.7	22.8000	738.00
2259	0.0655	159.1972	19.4170	0.1056	89.1426	404.79	-0.1000	7.9	13.3000	1650.00
2260	0.1080	68.3474	9.8296	0.0599	36.7184	123.74	-0.1000	8.2	16.7000	564.00
2261	0.0904	155.6460	18.6342	0.1150	73.1444	294.38	-0.1000	7.9	13.9000	1218.00
2262	0.0781	457.0789	308.9842	3.6328	163.2275	8947.56	-0.1000	7.3	17.0000	13740.00
2263	0.1003	219.1658	87.5769	0.8206	136.4528	2176.57	-0.1000	7.8	19.9000	4788.00
2264	0.1020	238.2578	98.5290	0.8198	134.1219	2152.22	-0.1000	7.3	22.9000	4788.00
2265	0.1192	147.4133	46.2852	0.3582	75.1647	759.31	-0.1000	8.1	18.8000	2112.00
2266	0.0554	290.8169	19.3784	0.1675	103.8544	383.18	-0.1000	7.3	19.4000	1530.00
2267	0.1591	113.6166	12.7070	0.1255	48.5078	262.79	-0.1000	7.7	13.2000	930.00
2268	0.0607	218.9633	25.3383	0.1963	150.1312	670.34	-0.1000	7.5	21.1000	1752.00
2269	0.1369	99.5204	11.3814	0.2055	42.0473	720.16	-0.1000	7.8	24.2000	1716.00
2270	0.3546	241.0706	23.3101	0.0567	67.1412	137.09	-0.1000	7.6	20.2000	1140.60
2271	0.2917	150.6399	15.2012	-0.1000	37.0270	54.34	-0.1000	7.8	19.2000	614.40
2272	0.3909	164.0940	19.2817	-0.1000	40.9059	59.16	-0.1000	7.6	18.6000	686.40
2273	0.2009	74.7605	15.4917	-0.1000	18.9111	33.94	-0.1000	7.9	21.4000	313.80
2274	0.1835	73.2203	10.9568	-0.1000	17.1637	24.61	-0.1000	7.8	17.2000	270.00
2275	0.3107	154.6632	17.7065	-0.1000	42.2801	73.96	-0.1000	7.7	19.8000	663.60
2276	0.1155	215.9217	23.7201	0.0788	61.4484	275.72	-0.1000	7.6	18.5000	1189.20
2277	0.1946	146.7834	10.6079	0.1250	67.9678	258.20	-0.1000	7.5	21.2000	1122.00
2308	0.0257	29.5504	14.9385	0.1218	13.4199	288.44	-0.1000	8.6	14.6000	1017.00
2309	-0.1000	11.6296	18.1941	0.1416	8.2526	240.15	-0.1000	9.1	13.7000	815.40

Values of -0.1 are below detection limits of testing procedure.

Sample Test Site Data for Northern Utah District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2199	-0.1000	0.27	94.34	-0.10	-0.1000	-0.10	8.61	-0.1000	-0.1000	-0.10	1.1	1,230
2259	-0.1000	0.18	666.16	-0.10	-0.1000	-0.10	4.81	-0.1000	-0.1000	-0.10	6.4	2,750
2260	0.4359	0.13	164.83	-0.10	-0.1000	-0.10	3.78	0.0322	-0.1000	-0.10	3.0	940
2261	-0.1000	0.18	474.65	-0.10	-0.1000	-0.10	4.19	-0.1000	-0.1000	-0.10	4.9	2,030
2262	-0.1000	1.59	-0.10	-0.10	-0.1000	-0.10	4.44	0.0998	-0.1000	0.06	91.4	22,900
2263	-0.1000	0.61	-0.10	-0.10	-0.1000	-0.10	2.99	-0.1000	-0.1000	-0.10	28.4	7,980
2264	-0.1000	0.62	-0.10	-0.10	-0.1000	-0.10	2.95	-0.1000	-0.1000	0.12	27.6	7,980
2265	-0.1000	0.29	-0.10	-0.10	-0.1000	-0.10	2.70	-0.1000	-0.1000	-0.10	12.7	3,520
2266	-0.1000	0.19	681.34	-0.10	-0.1000	-0.10	4.37	-0.1000	-0.1000	0.06	4.9	2,550
2267	-0.1000	0.17	375.10	-0.10	-0.1000	-0.10	4.21	-0.1000	-0.1000	0.14	5.2	1,550
2268	-0.1000	0.46	-0.10	-0.10	-0.1000	-0.10	4.93	-0.1000	-0.1000	0.07	8.5	2,920
2269	-0.1000	0.14	-0.10	-0.10	-0.1000	-0.10	3.36	-0.1000	-0.1000	-0.10	15.3	2,860
2270	-0.1000	0.09	573.18	-0.10	-0.1000	-0.10	2.23	-0.1000	-0.1000	-0.10	2.0	1,901
2271	-0.1000	0.07	249.66	-0.10	-0.1000	-0.10	2.31	-0.1000	-0.1000	-0.10	1.0	1,024
2272	-0.1000	0.08	297.46	-0.10	-0.1000	-0.10	2.29	-0.1000	-0.1000	-0.10	1.1	1,144
2273	-0.1000	-0.10	82.37	-0.10	-0.1000	-0.10	2.37	-0.1000	-0.1000	-0.10	0.9	523
2274	-0.1000	-0.10	59.60	-0.10	-0.1000	-0.10	2.46	-0.1000	-0.1000	-0.10	0.7	450
2275	-0.1000	0.09	290.20	-0.10	-0.1000	-0.10	2.43	-0.1000	-0.1000	-0.10	1.4	1,106
2276	-0.1000	0.12	572.50	-0.10	-0.1000	-0.10	2.91	-0.1000	-0.1000	-0.10	4.3	1,982
2277	-0.1000	0.14	500.17	-0.10	-0.1000	-0.10	3.32	-0.1000	-0.1000	-0.10	4.4	1,870
2308	-0.1000	0.42	409.34	-0.10	-0.1000	-0.10	4.09	0.0237	-0.1000	-0.10	11.0	1,695
2309	-0.1000	0.45	304.31	-0.10	-0.1000	-0.10	3.80	-0.1000	-0.1000	-0.10	13.2	1,359

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Northern Utah District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS ppm	V	Zn
2199	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	26.20	-0.1000	738	-0.1000	-0.10
2259	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	120.06	-0.1000	1,650	-0.1000	-0.10
2260	0.4359	-0.1000	0.13	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	25.54	-0.1000	564	-0.1000	-0.10
2261	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	94.06	-0.1000	1,218	-0.1000	-0.10
2262	-0.1000	0.0630	1.59	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	197.99	-0.1000	13,740	-0.1000	0.06
2263	-0.1000	-0.1000	0.61	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	84.59	-0.1000	4,788	-0.1000	-0.10
2264	-0.1000	-0.1000	0.62	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	88.03	-0.1000	4,788	-0.1000	0.12
2265	-0.1000	-0.1000	0.29	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	47.55	-0.1000	2,112	-0.1000	-0.10
2266	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	158.63	-0.1000	1,530	-0.1000	0.06
2267	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	31.54	-0.1000	930	-0.1000	0.14
2268	-0.1000	-0.1000	0.46	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	278.28	-0.1000	1,752	-0.1000	0.07
2269	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	23.96	-0.1000	1,716	-0.1000	-0.10
2270	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	21.86	-0.1000	1,141	-0.1000	-0.10
2271	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	14.82	-0.1000	614	-0.1000	-0.10
2272	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	13.79	-0.1000	686	-0.1000	-0.10
2273	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	10.44	-0.1000	314	-0.1000	-0.10
2274	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	9.57	-0.1000	270	-0.1000	-0.10
2275	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	14.69	-0.1000	664	-0.1000	-0.10
2276	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	41.05	-0.1000	1,189	-0.1000	-0.10
2277	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	39.93	-0.1000	1,122	-0.1000	-0.10
2308	-0.1000	-0.1000	0.42	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	17.56	-0.1000	1,017	-0.1000	-0.10
2309	-0.1000	-0.1000	0.45	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	15.93	-0.1000	815	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

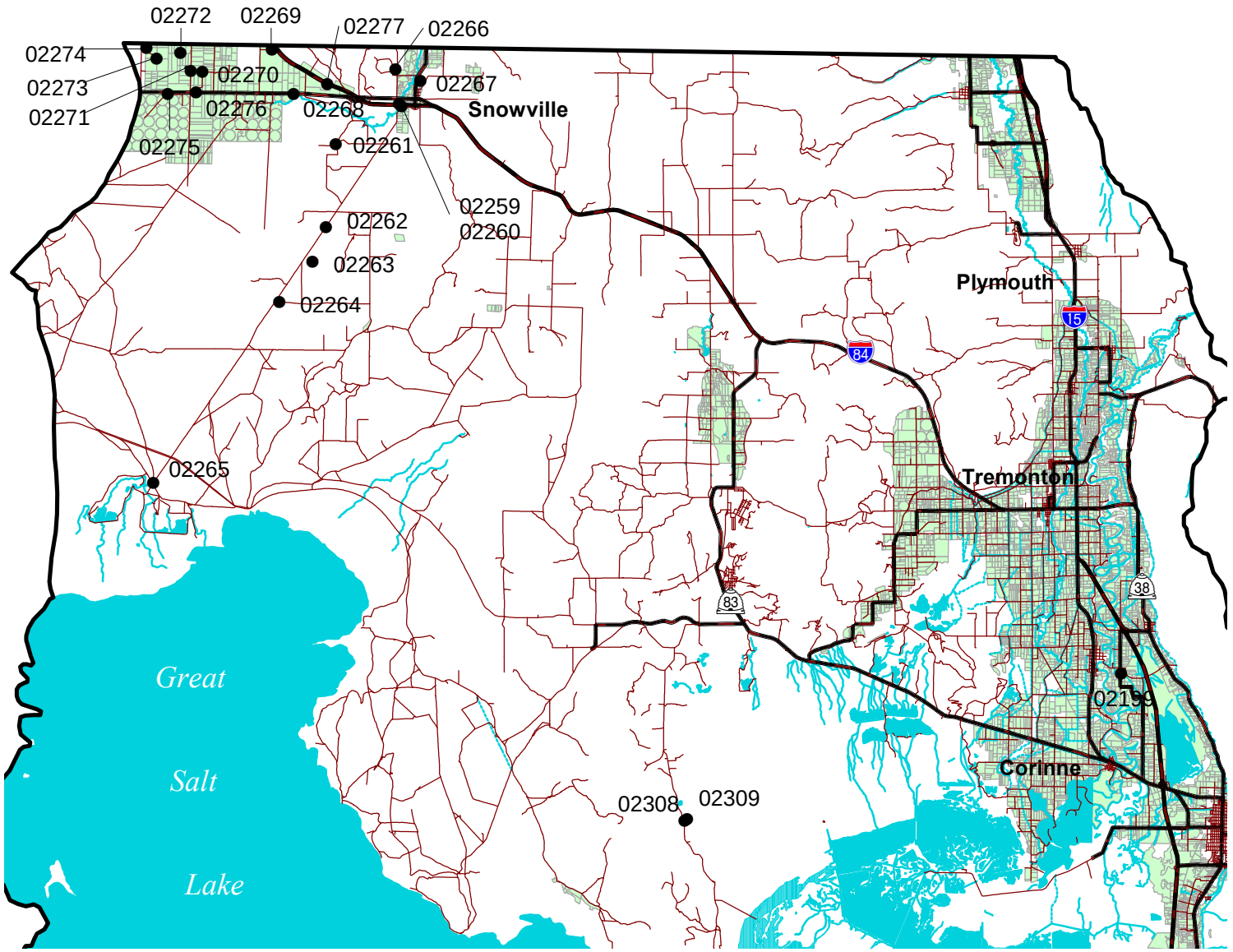
Sample Site Test Data for Northern Utah District

Culinary

Id	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS ppm	Zn	pH	Col	Ecoli	Hardness gpg
2199	-0.1000	0.1790	-0.1000	-0.1000	0.0227	-0.10	-0.1000	11.0	-0.1000	26.20	-0.1000	738	-0.10	7.65	1	1	9.0
2259	-0.1000	0.0655	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	-0.1	-0.1000	120.06	-0.1000	1,650	-0.10	7.92	0	0	14.5
2260	-0.1000	0.1080	-0.1000	-0.1000	-0.1000	0.43	0.0322	0.3	-0.1000	25.54	-0.1000	564	-0.10	8.23	1	1	6.1
2261	-0.1000	0.0904	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	1.0	-0.1000	94.06	-0.1000	1,218	-0.10	7.87	0	0	13.4
2262	0.0630	0.0781	-0.1000	-0.1000	-0.1000	-0.10	0.0998	-0.1	-0.1000	197.99	-0.1000	13,740	0.06	7.29	0	0	36.3
2263	-0.1000	0.1003	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	1.4	-0.1000	84.59	-0.1000	4,788	-0.10	7.77	0	0	20.8
2264	-0.1000	0.1020	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	1.3	-0.1000	88.03	-0.1000	4,788	0.12	7.30	1	0	21.8
2265	-0.1000	0.1192	-0.1000	-0.1000	-0.1000	0.05	-0.1000	0.3	-0.1000	47.55	-0.1000	2,112	-0.10	8.10	1	0	13.0
2266	-0.1000	0.0554	-0.1000	-0.1000	-0.1000	0.02	-0.1000	0.7	-0.1000	158.63	-0.1000	1,530	0.06	7.30	0	0	23.1
2267	-0.1000	0.1591	-0.1000	-0.1000	-0.1000	0.04	-0.1000	0.5	-0.1000	31.54	-0.1000	930	0.14	7.70	0	0	9.5
2268	-0.1000	0.0607	-0.1000	-0.1000	2.5910	0.06	-0.1000	7.3	-0.1000	278.28	-0.1000	1,752	0.07	7.47	1	0	21.6
2269	-0.1000	0.1369	-0.1000	-0.1000	-0.1000	0.06	-0.1000	0.6	-0.1000	23.96	-0.1000	1,716	-0.10	7.82	1	0	8.3
2270	-0.1000	0.3546	-0.1000	-0.1000	-0.1000	0.02	-0.1000	4.9	-0.1000	21.86	-0.1000	1,141	-0.10	7.58	0	0	18.0
2271	-0.1000	0.2917	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	2.2	-0.1000	14.82	-0.1000	614	-0.10	7.80	0	0	11.0
2272	-0.1000	0.3909	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	1.0	-0.1000	13.79	-0.1000	686	-0.10	7.64	1	0	12.0
2273	-0.1000	0.2009	-0.1000	-0.1000	-0.1000	0.02	-0.1000	1.0	-0.1000	10.44	-0.1000	314	-0.10	7.86	1	0	5.5
2274	-0.1000	0.1835	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	0.6	-0.1000	9.57	-0.1000	270	-0.10	7.78	0	0	5.3
2275	-0.1000	0.3107	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	0.6	-0.1000	14.69	-0.1000	664	-0.10	7.70	0	0	11.5
2276	-0.1000	0.1155	-0.1000	-0.1000	-0.1000	0.02	-0.1000	3.7	-0.1000	41.05	-0.1000	1,189	-0.10	7.56	0	0	16.2
2277	-0.1000	0.1946	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	1.5	-0.1000	39.93	-0.1000	1,122	-0.10	7.54	0	0	12.6
2308	-0.1000	0.0257	-0.1000	-0.1000	-0.1000	0.04	0.0237	1.9	-0.1000	17.56	-0.1000	1,017	-0.10	8.61	0	0	2.5
2309	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	-0.1	-0.1000	15.93	-0.1000	815	-0.10	9.08	0	0	1.2

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

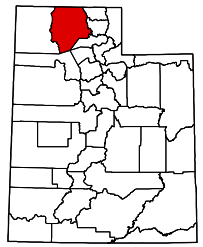
Map 4. Northern Utah District



Sample Site
Irrigated Land
Water Body
SCD Boundary
Major Road
Other Road
Water Course
Ditch or Canal

Map Scale 1:438,561 (1 inch = 6.9 miles)

District Location



Zone 2

UACD Zone 2 consists of six districts in six counties including Weber, Morgan, Davis, Salt Lake, and Tooele counties.

Forty-five sites were sampled in the six districts of Zone 2 during the spring, summer, and fall of 2002 with two sampled in the Davis County District, two in the Grantsville District, 19 in the Salt Lake District, and 21 in the Weber District. A separate narrative report is presented for each district with maps showing the location of the sample sites. Each report covers three categories of water quality criteria: irrigation, livestock and culinary. Data are presented in four tables for each zone. These include general parameters: temperature, pH, total dissolved solids (TDS) and chemicals for which there are no standards; irrigation, livestock, and drinking water parameters.

Davis County District

Two samples were collected in the Davis County District. Both samples in this area tested soft with grains per gallon (gpg) values of 2.1. Sampled water temperature ranges from 17.3 ºC to 18.3 ºC, with a mean of 17.8 ºC. The pH for the area has a mean of 8.08 and ranges from 8.06 to 8.09.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Neither well in this area exceeded the irrigation standard of 750 µmhos/cm.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Both samples tested below 3.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l, and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah.

No other elements were above concentrations that are harmful to plants.

Livestock:

No livestock standards were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for both samples is below the EPA aesthetic standard of 500 ppm. In excess of 500 ppm the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm.

Both samples, 2200 and 2201, have high manganese (Mn) levels. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

No samples from this district were found to have bacterial contamination.

Sample Site Test Data for Davis County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2200	-0.1000	28.83	1.49	-0.1000	6.37	22.40	-0.10	8.06	17.3	169
2201	-0.1000	28.88	1.47	-0.1000	6.39	22.51	-0.10	8.09	18.3	175

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2200	-0.1000	-0.10	13.51	-0.10	-0.1000	0.1712	2.56	0.0964	-0.1000	-0.10	1.0	281
2201	-0.1000	-0.10	13.95	-0.10	-0.1000	0.1886	2.48	0.1030	-0.1000	-0.10	1.0	292

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2200	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.84	-0.1000	169	-0.1000	-0.10
2201	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.85	-0.1000	175	-0.1000	-0.10

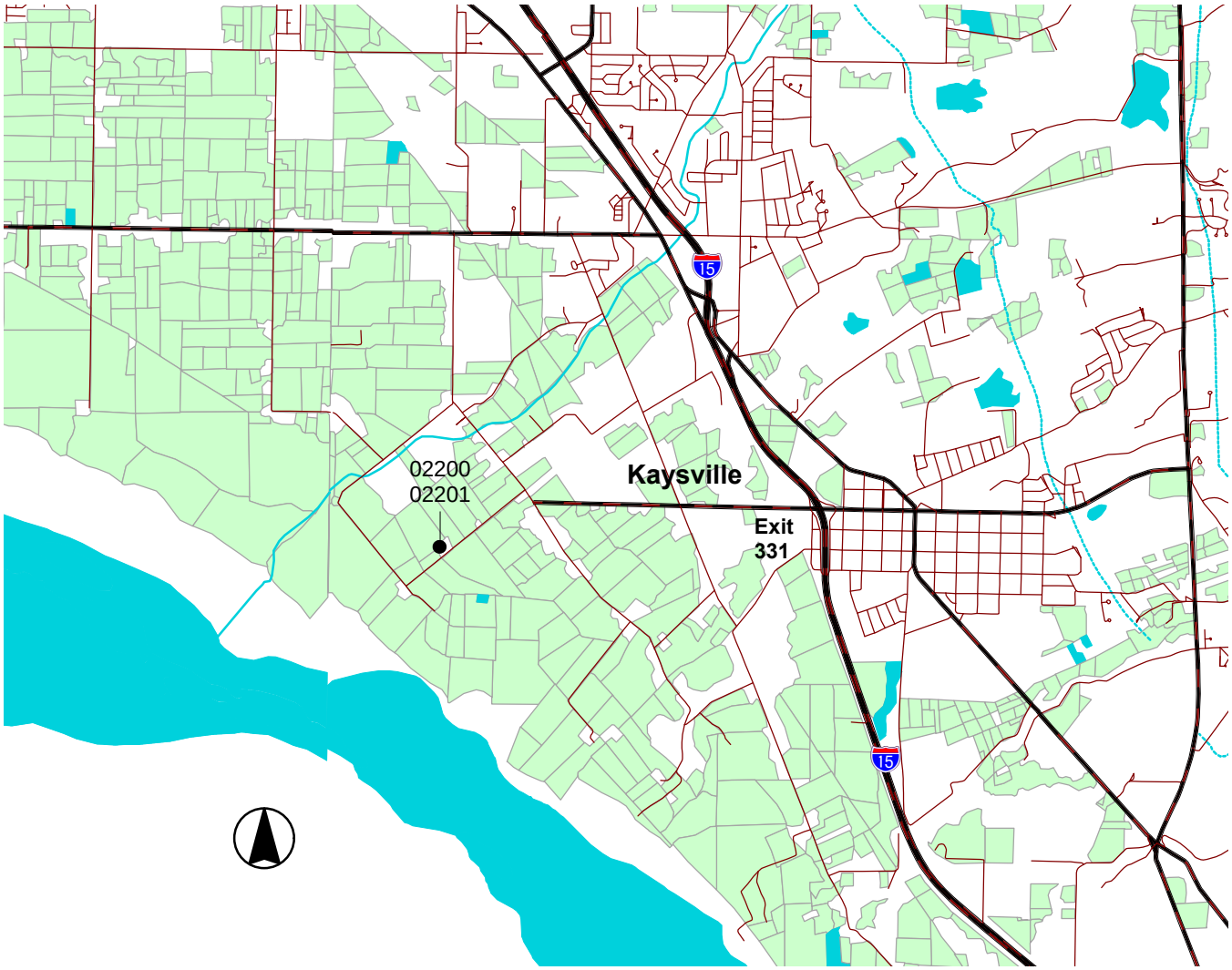
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2200	-0.1000	0.2336	-0.1000	-0.1000	-0.1000	0.1712	0.0964	-0.1	-0.1000	0.84	-0.1000	169	-0.10	8.06	0	0	2.1
2201	-0.1000	0.2366	-0.1000	-0.1000	-0.1000	0.1886	0.1030	-0.1	-0.1000	0.85	-0.1000	175	-0.10	8.09	0	0	2.1

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

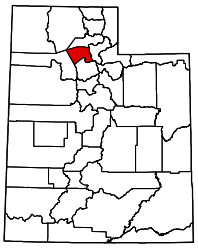
Map 5. Davis County District



Map Scale 1:61,422 (1 inch = 0.97 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Grantsville District

Two wells were samples in the Grantsville District. The water sampled varies from moderate to hard, with grains per gallon (gpg) readings from 4.4 to 12.4 with a mean of 8.42. Sampled water temperature ranges from 17.0 ºC to 18.7 ºC, with a mean of 17.85 ºC. The pH for this area has a mean of 7.43 and ranges from 7.38 to 7.48.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Both wells in this area exceeded the irrigation standard of 750 µmhos/cm (2128 and 2129). Neither exceed the sever level of 3,000 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Sample 2128 has elevated SAR.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Both samples collected in this area have high bicarbonate, which is common for water in Utah. Neither sample exceeded the severe level of 8.5 meq/l.

Some elements are toxic to plants. Chlorine, found in the form of Chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Both samples have elevated chlorine levels. Water from sample 2129 could cause severe damage to plants.

No other elements were above concentrations that are harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for both samples exceeds the EPA aesthetic standard of 500 ppm. In excess of 500 ppm the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand,

indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Many species of coliform, including E. coli bacteria are not harmful although some strains of E. coli such as 0157, are very infectious. Sample 2129 is contaminated with E. coli bacteria. The well from which this sample was collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Grantsville District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2128	-0.1000	53.51	2.95	-0.1000	22.35	108.14	-0.10	7.48	18.7	580
2129	-0.1000	148.19	3.55	-0.1000	63.78	120.73	-0.10	7.38	17	1,181

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2128	-0.1000	-0.10	185.55	-0.10	-0.1000	-0.1000	3.78	-0.1000	-0.1000	-0.10	3.1	967
2129	-0.1000	-0.10	612.80	-0.10	-0.1000	0.0533	2.70	0.0241	-0.1000	0.15	2.1	1,968

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2128	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	9.21	-0.1000	580	-0.1000	-0.10
2129	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	15.24	-0.1000	1,181	-0.1000	0.15

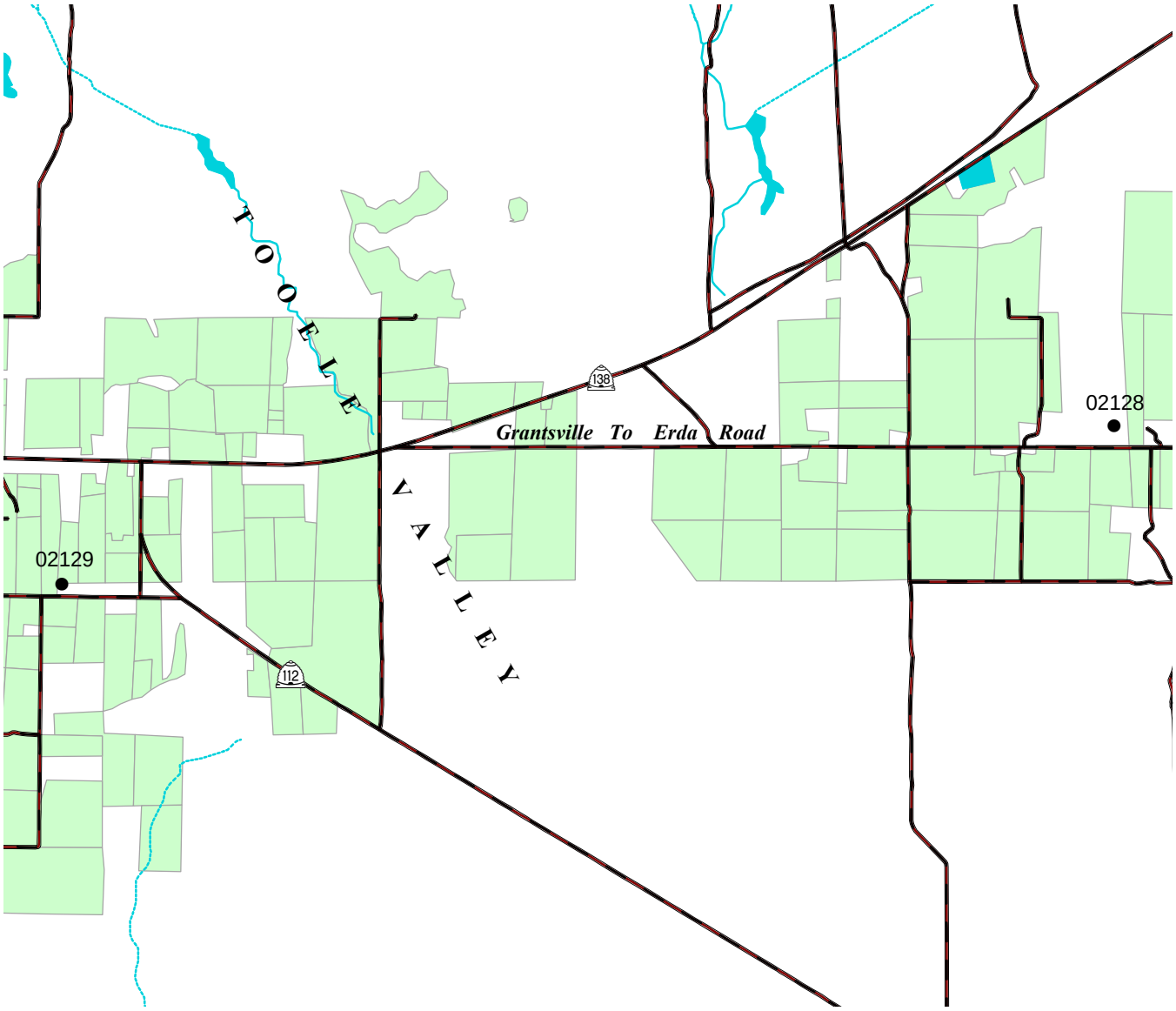
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2128	-0.1000	0.1298	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.3	-0.1000	9.21	-0.1000	580	-0.10	7.48	0	0	4.4
2129	-0.1000	0.6471	-0.1000	-0.1000	-0.1000	0.0533	0.0241	0.4	-0.1000	15.24	-0.1000	1,181	0.15	7.38	1	1	12.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

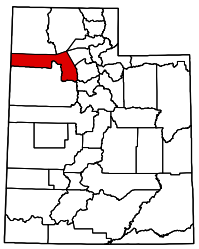
Map 6. Grantsville District



Map Scale 1:40,717 (1 inch = 0.64 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Salt Lake District

Water in the Salt Lake District varies from soft to very hard, with grains per gallon (gpg) ranging from 0.2 to 16.3 with a mean of 7.09. Sampled water temperature ranges from 4 °C to 83 °C, with a mean of 18.65 °C. The pH for the area has a mean of 7.71 and ranges from 6.72 to 8.94. The pH in sample 2126 is elevated.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Only five of the nineteen samples have EC values **less** than 750 µmhos/cm: samples 2064, 2123, 2175, 2178, and 2340. Sample 2176 exceeds the severe-injury level of 3,000 µmhos/cm, which would affect most plants.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Six of the wells sampled in this district, 2126, 2176, 2177, 2246, 2341, and 2342, have elevated SAR values. Sample 2126 exceed 9 µmhos/cm and may cause severe damage to the soil if used for irrigation.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Some specific elements can be toxic to plants. Chlorine, found in the form of Chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2121, 2122, 2126, 2127, 2177, 2245, 2246, 2338, 2341, and 2342 have elevated chlorine. Samples 2121, 2122, and 2342 have over 355 ppm of chlorine and will likely cause severe injury to plants.

Samples 2064 and 2176 have elevated manganese (Mn). Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca).

No other elements were found in concentrations harmful to plants.

Livestock:

Samples 2121, 2126, 2245, 2246, and 2338 have elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for samples 2064,

2123, 2125, 2175, 2178, 2339, and 2340 did **not** exceed the EPA aesthetic standard of 500 ppm. The remaining samples with salinity values above this level may have water off-flavored. This it is not a health problem until TDS reaches 2,000 ppm. Sample 2176 exceeds the 2,000 ppm level.

Several minerals were found to exceed the aesthetic drinking water quality standard. Samples 2064 and 2123 have high iron (Fe). This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. This is an aesthetic issue, not a health concern.

Four samples have high manganese (Mn) concentrations: 2064, 2123, 2176, and 2339. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Sample 2245 also has high sulfur (S). Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2064, 2124, 2176, 2178, 2246, 2338, through, 2340, and 2342 are contaminated with coliform. Sample 2340 is contaminated with E. coli. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Salt Lake District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2064	-0.1000	130.06	4.72	-0.1000	46.29	80.47	-0.10	7.44	12.8	408
2121	-0.1000	168.10	6.50	0.0654	76.55	126.41	-0.10	7.65	14.7	1326
2122	-0.1000	96.69	4.36	0.0532	56.37	86.51	-0.10	7.67	15.4	849
2123	-0.1000	44.37	2.55	-0.1000	21.88	66.20	0.28	8.05	15.2	391
2124	-0.1000	99.77	2.15	-0.1000	32.69	80.63	-0.10	7.30	12.4	630
2125	-0.1000	88.31	1.93	-0.1000	31.77	32.11	-0.10	7.70	15.7	478
2126	-0.1000	2.58	2.01	-0.1000	0.87	386.81	-0.10	8.94	20.2	1088
2127	-0.1000	92.21	6.33	-0.1000	25.30	37.01	-0.10	7.34	18.5	528
2175	-0.1000	21.21	0.61	-0.1000	9.71	4.53	-0.10	7.95	4.0	118
2176	-0.1000	227.93	5.86	-0.1000	50.96	410.40	-0.10	7.49	15.9	2034
2177	-0.1000	115.12	2.32	0.0682	43.95	154.52	-0.10	7.65	9.3	993
2178	-0.1000	53.52	2.26	-0.1000	12.75	18.02	-0.10	8.23	16.6	274
2245	-0.1000	131.18	9.79	0.1016	42.02	105.23	-0.10	7.96	17.4	1050
2246	-0.1000	114.27	8.04	0.1239	50.50	155.44	-0.10	7.85	18.3	983
2338	-0.1000	68.46	9.70	0.1020	37.61	114.27	-0.10	7.56	17.0	1000
2339	-0.1000	37.03	10.37	0.1301	12.48	55.69	-0.10	7.76	16.0	483
2340	-0.1000	26.82	0.82	-0.1000	5.52	6.63	-0.10	6.72	83.0	277
2341	-0.1000	48.25	3.06	-0.1000	20.34	104.57	-0.10	7.60	17.0	877
2342	-0.1000	112.97	6.73	0.0606	46.55	231.27	-0.10	7.60	15.0	903

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Salt Lake District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2064	-0.1000	0.16	107.05	-0.10	-0.1000	0.4416	5.84	0.2567	-0.1000	-0.10	1.5	680
2121	-0.1000	0.12	540.82	-0.10	-0.1000	0.0613	3.24	-0.1000	-0.1000	1.21	2.0	2,210
2122	-0.1000	0.14	360.35	-0.10	-0.1000	-0.1000	2.72	-0.1000	-0.1000	0.50	1.7	1,415
2123	-0.1000	0.12	20.82	-0.10	-0.1000	0.4482	4.75	0.1130	-0.1000	-0.10	2.0	651
2124	-0.1000	0.14	117.69	-0.10	-0.1000	-0.1000	5.55	-0.1000	-0.1000	-0.10	1.8	1,050
2125	-0.1000	-0.10	44.94	-0.10	-0.1000	0.0731	3.67	-0.1000	-0.1000	0.21	0.7	796
2126	-0.1000	0.52	261.21	-0.10	0.0314	0.0930	8.46	-0.1000	-0.1000	-0.10	53.2	1,813
2127	-0.1000	0.09	171.09	-0.10	-0.1000	-0.1000	3.12	-0.1000	-0.1000	-0.10	0.9	880
2175	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	1.71	-0.1000	-0.1000	-0.10	0.2	197
2176	-0.1000	0.10	-0.10	-0.10	0.0541	0.2100	6.85	2.2810	-0.1000	0.13	6.4	3,390
2177	-0.1000	0.10	314.34	-0.10	-0.1000	-0.1000	6.50	-0.1000	-0.1000	-0.10	3.1	1,655
2178	-0.1000	-0.10	65.00	-0.10	-0.1000	0.0579	2.15	-0.1000	-0.1000	0.08	0.6	457
2245	-0.1000	0.21	152.58	-0.10	0.0259	-0.1000	4.44	-0.1000	-0.1000	-0.10	2.0	1,750
2246	-0.1000	0.29	260.91	-0.10	-0.1000	-0.1000	5.65	-0.1000	-0.1000	-0.10	3.0	1,639
2338	-0.1000	0.24	166.43	-0.10	-0.1000	-0.1000	3.51	-0.1000	-0.1000	-0.10	2.8	1,667
2339	-0.1000	0.11	108.56	-0.10	-0.1000	-0.1000	2.11	0.1304	-0.1000	0.04	2.0	805
2340	-0.1000	-0.10	12.73	-0.10	-0.1000	0.0227	1.49	-0.1000	-0.1000	0.05	0.3	461
2341	-0.1000	0.08	280.88	-0.10	-0.1000	0.0297	3.45	-0.1000	-0.1000	-0.10	3.2	1,461
2342	-0.1000	0.15	390.25	-0.10	-0.1000	0.1147	5.32	-0.1000	-0.1000	-0.10	4.6	1,505

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Salt Lake District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2064	-0.1000	-0.1000	0.16	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	66.82	-0.1000	408	-0.1000	-0.10
2121	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	0.0352	-0.1000	-0.1000	72.05	-0.1000	1,326	-0.1000	1.21
2122	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.91	-0.1000	849	-0.1000	0.50
2123	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	25.38	-0.1000	391	-0.1000	-0.10
2124	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	40.80	-0.1000	630	-0.1000	-0.10
2125	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	60.02	-0.1000	478	-0.1000	0.21
2126	-0.1000	-0.1000	0.52	-0.1000	-0.1000	-0.1000	0.0324	-0.1000	-0.1000	36.70	-0.1000	1,088	0.0277	-0.10
2127	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.01	-0.1000	528	0.0107	-0.10
2175	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.71	-0.1000	118	-0.1000	-0.10
2176	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.46	-0.1000	2,034	-0.1000	0.13
2177	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.98	-0.1000	993	-0.1000	-0.10
2178	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.75	-0.1000	274	-0.1000	0.08
2245	-0.1000	-0.1000	0.21	-0.1000	-0.1000	-0.1000	0.0112	-0.1000	-0.1000	101.67	-0.1000	1,050	-0.1000	-0.10
2246	-0.1000	-0.1000	0.29	-0.1000	-0.1000	-0.1000	0.0136	-0.1000	-0.1000	74.21	-0.1000	983	-0.1000	-0.10
2338	-0.1000	-0.1000	0.24	-0.1000	-0.1000	-0.1000	0.0116	-0.1000	-0.1000	63.44	-0.1000	1,000	-0.1000	-0.10
2339	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.19	-0.1000	483	-0.1000	0.04
2340	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.41	-0.1000	277	-0.1000	0.05
2341	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.49	-0.1000	877	-0.1000	-0.10
2342	-0.1000	-0.1000	0.15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	47.65	-0.1000	903	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

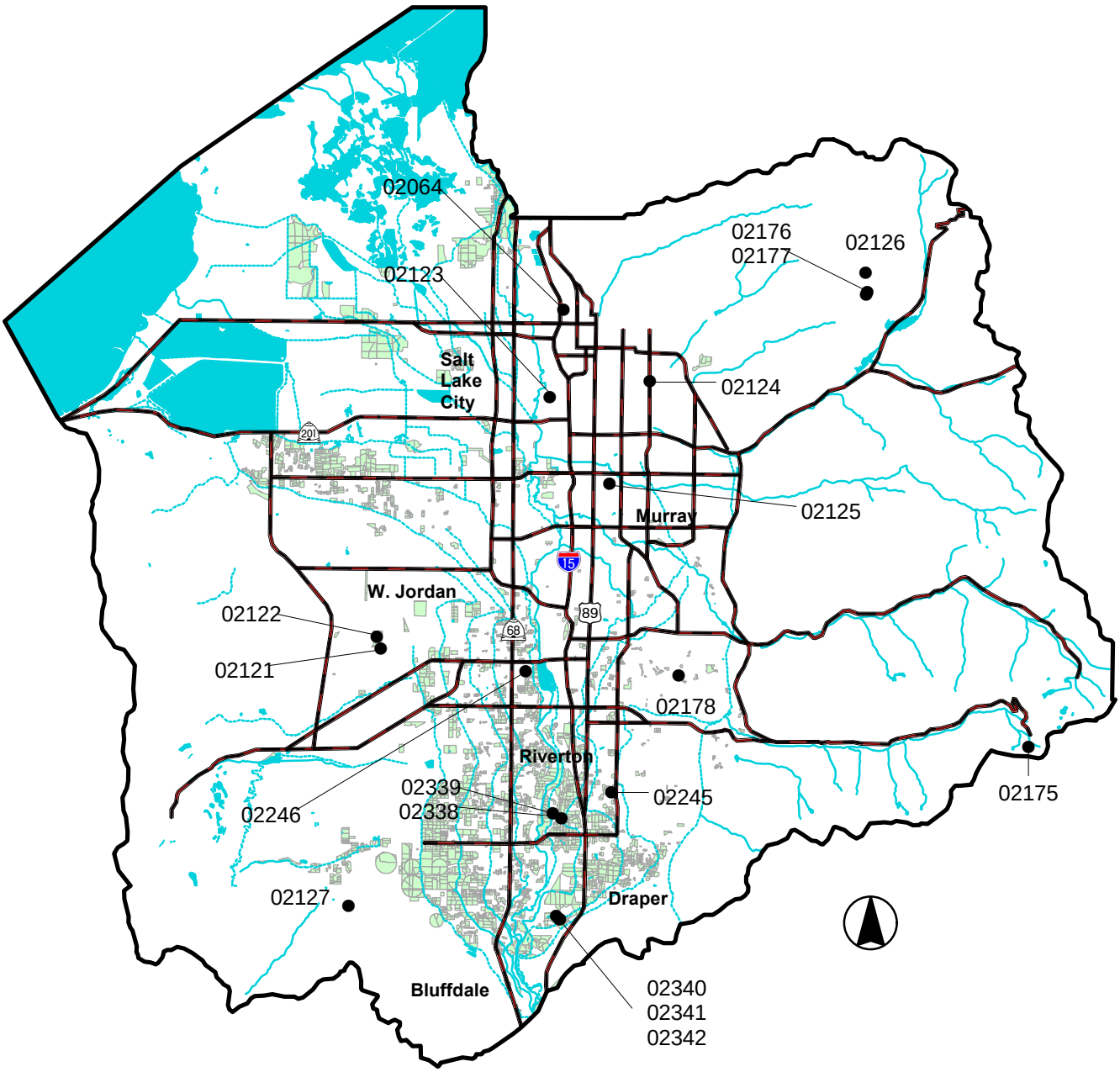
Sample Site Test Data for Salt Lake District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2064	-0.1000	0.1050	-0.1000	-0.1000	-0.1000	0.4416	0.2567	0.2	-0.1000	66.82	-0.1000	408	-0.10	7.44	1	0	10.3
2121	-0.1000	0.0543	-0.1000	-0.1000	-0.1000	0.0613	-0.1000	8.0	-0.1000	72.05	-0.1000	1,326	1.21	7.65	0	0	14.3
2122	-0.1000	0.1553	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.7	-0.1000	14.91	-0.1000	849	0.50	7.67	0	0	9.0
2123	-0.1000	0.1007	-0.1000	-0.1000	-0.1000	0.4482	0.1130	0.2	-0.1000	25.38	-0.1000	391	-0.10	8.05	0	0	3.9
2124	-0.1000	0.0548	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.5	-0.1000	40.80	-0.1000	630	-0.10	7.30	1	0	7.7
2125	-0.1000	0.0545	-0.1000	-0.1000	-0.1000	0.0731	-0.1000	2.3	-0.1000	60.02	-0.1000	478	0.21	7.70	0	0	7.0
2126	-0.1000	0.0440	-0.1000	-0.1000	0.0314	0.0930	-0.1000	0.6	-0.1000	36.70	-0.1000	1,088	-0.10	8.94	0	0	0.2
2127	-0.1000	0.1872	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.9	-0.1000	15.01	-0.1000	528	-0.10	7.34	0	0	6.9
2175	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	1.71	-0.1000	118	-0.10	7.95	0	0	1.8
2176	-0.1000	0.2913	-0.1000	-0.1000	0.0541	0.2100	2.2810	-0.1	-0.1000	13.46	-0.1000	2,034	0.13	7.49	1	0	16.3
2177	-0.1000	0.1002	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	27.98	-0.1000	993	-0.10	7.65	0	0	9.3
2178	-0.1000	0.1289	-0.1000	-0.1000	-0.1000	0.0579	-0.1000	0.5	-0.1000	8.75	-0.1000	274	0.08	8.23	1	0	3.9
2245	-0.1000	0.0328	-0.1000	-0.1000	0.0259	-0.1000	-0.1000	3.0	-0.1000	101.67	-0.1000	1,050	-0.10	7.96	0	0	10.1
2246	-0.1000	0.0511	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.1	-0.1000	74.21	-0.1000	983	-0.10	7.85	1	0	9.6
2338	-0.1000	0.0298	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.3	-0.1000	63.44	-0.1000	1,000	-0.10	7.56	1	0	6.2
2339	-0.1000	0.1275	-0.1000	-0.1000	-0.1000	-0.1000	0.1304	-0.1	-0.1000	11.19	-0.1000	483	0.04	7.76	1	0	2.9
2340	-0.1000	0.0469	-0.1000	-0.1000	-0.1000	0.0227	-0.1000	0.1	-0.1000	9.41	-0.1000	277	0.05	6.72	1	1	1.9
2341	-0.1000	0.0374	-0.1000	-0.1000	-0.1000	0.0297	-0.1000	4.0	-0.1000	18.49	-0.1000	877	-0.10	7.60	0	0	4.0
2342	-0.1000	0.1111	-0.1000	-0.1000	-0.1000	0.1147	-0.1000	6.3	-0.1000	47.65	-0.1000	903	-0.10	7.60	1	0	9.3

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Map 7. Salt Lake District



Sample Site

Irrigated Land

Water Body

SCD Boundary

Major Road

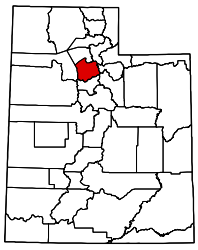
Other Road

Water Course

Ditch or Canal

Map Scale 1:338,432 (1 inch = 5.3 miles)

District Location



Weber District

Water in the Weber District varies from soft to moderate-hard, with grains per gallon (gpg) ranging from 1.5 to 9.6 with a mean of 4.58. Sampled water temperature ranges from 10.0 °C to 28.2 °C, with a mean of 15.14 °C. The pH for the area has a mean of 7.80 and ranges from 7.08 to 8.89. There may have been faulty meter readings on some of the samples from this district.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Eight of the samples in this area, 2153 through 2156, 2195 through 2197, and 2299, exceeded the 750 µmhos/cm standard. None of the samples exceeded the severe-injury level of 3,000 µmhos/cm, which would affect most plants.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2154, 2156, and 2299 from this area exceed the SAR standard with values greater than 3.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All **but one** of the samples, 2304, has high bicarbonate, which is common for water in Utah. Sample 2156 exceeds the 8.5 level.

Some specific elements can be toxic to plants. Chlorine, found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2154 through 2156, 2195 through 2197, and 2299 have elevated chlorine. Samples 2156 and 2196 exceed the 355 ppm level.

Samples 2154, 2155, and 2195, through 2197 have elevated manganese (Mn). Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca).

No other elements were found in concentrations harmful to plants.

Livestock:

Sample 2155 has elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Seven of the samples,

2154 through 2156, 2195 through 2197, and 2299, exceed the EPA aesthetic standard of 500 ppm for salinity. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

Arsenic (As) exceeded the primary drinking water standard in sample 2153 with a value of 0.15 - three times the standard of 0.05.

Well 2196 exceeded the primary health standard for barium (Ba) and should not be used for drinking.

Two minerals, iron (Fe) and manganese (Mn), were found to exceed the aesthetic drinking water quality standard. Samples 2195 and 2197 have high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Six samples have high manganese concentrations: 2153 through 2156, 2195 through 2197, and 2310. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Samples 2154 through 2156 exceed the EPA nitrate (NO_3) standard of 10 ppm nitrate expressed as nitrogen (NO_3-N). NO_3 is an important nutrient for plant growth. It is found in nitrogen fertilizers, manure, septic systems, and some minerals. NO_3 is toxic to young infants (usually less than 6 months of age) and causes “blue baby syndrome.” NO_3 can only be removed from water by reverse osmosis or distillation.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2153, 2155, 2156, 2302 through 2304, 2306, and 2307 are contaminated with coliform. Samples 2153 and 2156 were also contaminated with E. coli. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Weber District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2153	-0.1000	45.84	23.40	0.0688	38.20	74.45	0.87	7.95	17.2	480
2154	-0.1000	95.23	19.59	-0.1000	26.22	146.46	0.75	7.24	15.3	838
2155	-0.1000	80.52	146.88	-0.1000	26.49	69.67	6.28	7.60	22.6	799
2156	-0.1000	129.42	35.24	0.0522	34.45	368.47	-0.10	7.08	15.7	1494
2195	-0.1000	69.52	22.67	0.1948	17.55	92.42	-0.10	7.78	17.5	593
2196	-0.1000	94.96	20.03	0.1633	24.69	123.16	-0.10	7.58	28.2	827
2197	-0.1000	77.83	21.25	0.1704	19.33	96.05	-0.10	7.82	16.7	640
2198	-0.1000	52.70	1.00	-0.1000	15.85	15.40	-0.10	7.70	14.8	246
2233	-0.1000	20.06	2.56	-0.1000	6.08	48.45	-0.10	_	_	_
2297	-0.1000	58.42	1.27	-0.1000	16.30	9.10	-0.10	8.07	12.3	253
2298	-0.1000	53.14	1.04	-0.1000	15.14	7.34	-0.10	8.07	10.5	224
2299	-0.1000	59.30	3.08	-0.1000	21.35	106.66	-0.10	8.13	12.3	572
2300	-0.1000	58.18	1.03	-0.1000	16.16	11.58	-0.10	7.99	10.0	261
2301	-0.1000	62.62	1.07	-0.1000	15.75	12.49	-0.10	7.99	14.0	275
2302	-0.1000	59.42	1.24	-0.1000	16.11	12.47	-0.10	7.97	11.7	268
2303	-0.1000	44.99	0.68	-0.1000	6.86	16.39	-0.10	7.23	14.2	220
2304	-0.1000	23.11	0.79	-0.1000	7.28	15.29	-0.10	7.95	13.3	157
2305	-0.1000	44.25	0.46	-0.1000	11.12	6.06	-0.10	7.76	12.6	196
2306	-0.1000	20.14	0.61	-0.1000	7.97	10.43	-0.10	7.71	12.8	125
2307	-0.1000	103.61	13.34	-0.1000	22.25	17.16	0.22	7.54	13.9	440
2310	-0.1000	19.81	2.37	-0.1000	5.85	42.13	-0.10	8.89	17.2	206

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Weber District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2153	-0.1000	0.35	79.90	-0.10	-0.1000	0.0601	6.54	0.0779	-0.1000	-0.10	2.0	800
2154	-0.1000	0.27	199.34	-0.10	-0.1000	0.0708	6.46	0.2389	-0.1000	-0.10	3.4	1,397
2155	-0.1000	0.38	151.94	-0.10	-0.1000	0.0372	5.94	0.2325	-0.1000	0.42	1.7	1,331
2156	-0.1000	0.39	542.36	-0.10	-0.1000	0.0296	9.22	0.1449	-0.1000	-0.10	7.4	2,490
2195	0.0671	0.13	232.40	-0.10	-0.1000	0.3066	3.20	0.3153	-0.1000	-0.10	2.6	989
2196	-0.1000	0.10	370.94	-0.10	-0.1000	0.2527	2.62	0.3950	-0.1000	-0.10	2.9	1,379
2197	0.0500	0.12	258.85	-0.10	-0.1000	0.3180	3.16	0.3582	-0.1000	0.04	2.5	1,066
2198	-0.1000	-0.10	17.56	-0.10	-0.1000	-0.1000	3.80	-0.1000	-0.1000	0.12	0.5	410
2233	-0.1000	0.11	40.19	-0.10	-0.1000	0.0249	2.75	0.0381	-0.1000	-0.10	2.4	-
2297	-0.1000	-0.10	18.00	-0.10	-0.1000	-0.1000	3.65	-0.1000	-0.1000	0.09	0.3	421
2298	-0.1000	-0.10	13.22	-0.10	-0.1000	0.0287	3.45	-0.1000	-0.1000	0.05	0.2	374
2299	-0.1000	-0.10	194.63	-0.10	-0.1000	-0.1000	3.34	-0.1000	-0.1000	0.22	3.0	954
2300	-0.1000	-0.10	17.19	-0.10	-0.1000	0.0217	3.96	-0.1000	-0.1000	0.14	0.3	435
2301	-0.1000	-0.10	22.70	-0.10	-0.1000	-0.1000	3.86	-0.1000	-0.1000	-0.10	0.4	459
2302	-0.1000	-0.10	18.08	-0.10	-0.1000	-0.1000	3.90	-0.1000	-0.1000	-0.10	0.4	446
2303	-0.1000	-0.10	38.45	-0.10	-0.1000	-0.1000	2.02	-0.1000	-0.1000	-0.10	0.6	367
2304	-0.1000	-0.10	35.91	-0.10	-0.1000	0.2020	1.32	-0.1000	-0.1000	-0.10	0.7	261
2305	-0.1000	-0.10	10.91	-0.10	-0.1000	-0.1000	2.75	-0.1000	-0.1000	-0.10	0.2	327
2306	-0.1000	-0.10	7.88	-0.10	-0.1000	-0.1000	1.53	-0.1000	-0.1000	-0.10	0.5	208
2307	-0.1000	-0.10	29.53	-0.10	-0.1000	-0.1000	6.85	-0.1000	-0.1000	-0.10	0.4	734
2310	-0.1000	-0.10	19.49	-0.10	-0.1000	0.0440	2.83	0.0511	-0.1000	-0.10	2.1	343

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Weber District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2153	-0.1000	0.1512	0.35	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.54	-0.1000	480	-0.10	-0.10
2154	-0.1000	-0.1000	0.27	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.41	-0.1000	838	-0.10	-0.10
2155	-0.1000	0.0498	0.38	-0.1000	-0.1000	-0.1000	0.0178	-0.1000	-0.1000	28.85	-0.1000	799	-0.10	0.42
2156	-0.1000	-0.1000	0.39	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.04	-0.1000	1,494	-0.10	-0.10
2195	0.0671	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.43	-0.1000	593	-0.10	-0.10
2196	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.20	-0.1000	827	-0.10	-0.10
2197	0.0500	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.59	-0.1000	640	-0.10	0.04
2198	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.42	-0.1000	246	-0.10	0.12
2233	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.68	-0.1000	0	-0.10	-0.10
2297	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.75	-0.1000	253	-0.10	0.09
2298	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.92	-0.1000	224	-0.10	0.05
2299	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.59	-0.1000	572	-0.10	0.22
2300	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.75	-0.1000	261	-0.10	0.14
2301	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.11	-0.1000	275	-0.10	-0.10
2302	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.67	-0.1000	268	-0.10	-0.10
2303	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.05	-0.1000	220	-0.10	-0.10
2304	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.78	-0.1000	157	-0.10	-0.10
2305	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.52	-0.1000	196	-0.10	-0.10
2306	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.63	-0.1000	125	-0.10	-0.10
2307	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.05	-0.1000	440	-0.10	-0.10
2310	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.51	-0.1000	206	-0.10	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

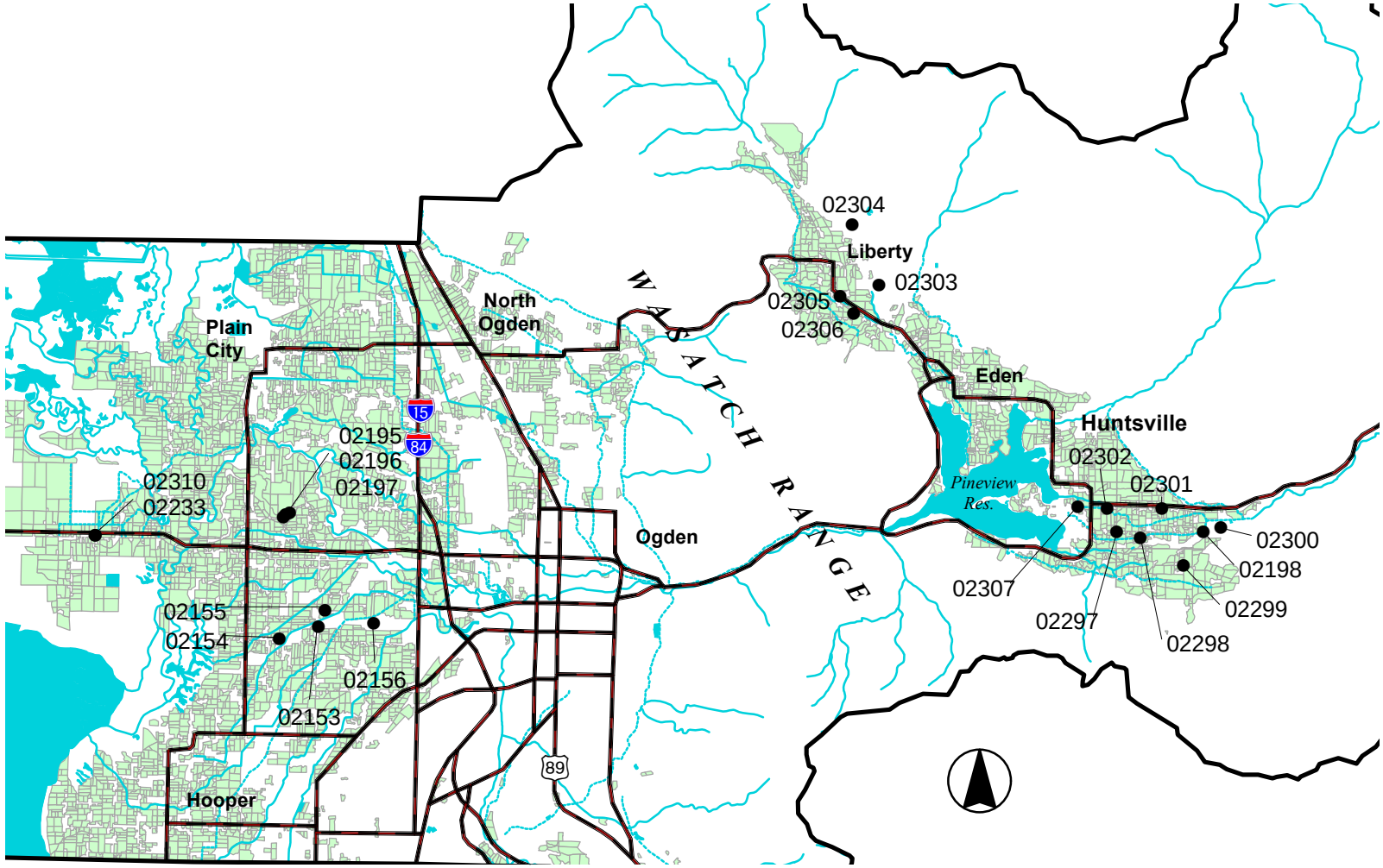
Sample Site Test Data for Weber District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2153	0.1512	0.2350	-0.1000	-0.1000	-0.1000	0.0601	0.0779	0.0	-0.1000	12.54	-0.1000	480	-0.10	7.95	1	1	4.9
2154	-0.1000	0.2976	-0.1000	-0.1000	-0.1000	0.0708	0.2389	15.9	-0.1000	17.41	-0.1000	838	-0.10	7.24	0	0	7.1
2155	0.0498	0.1550	-0.1000	-0.1000	-0.1000	0.0372	0.2325	15.9	-0.1000	28.85	-0.1000	799	0.42	7.60	1	0	6.3
2156	-0.1000	0.5707	-0.1000	-0.1000	-0.1000	0.0296	0.1449	14.6	-0.1000	34.04	-0.1000	1,494	-0.10	7.08	1	1	9.6
2195	-0.1000	0.8409	-0.1000	-0.1000	-0.1000	0.3066	0.3153	-0.1	-0.1000	1.43	-0.1000	593	-0.10	7.78	0	0	5.1
2196	-0.1000	1.1602	-0.1000	-0.1000	-0.1000	0.2527	0.3950	-0.1	-0.1000	2.20	-0.1000	827	-0.10	7.58	0	0	7.0
2197	-0.1000	0.8211	-0.1000	-0.1000	-0.1000	0.3180	0.3582	0.3	-0.1000	1.59	-0.1000	640	0.04	7.82	0	0	5.7
2198	-0.1000	0.0571	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	4.42	-0.1000	246	0.12	7.70	0	0	4.0
2233	-0.1000	0.1817	-0.1000	-0.1000	-0.1000	0.0249	0.0381		-0.1000	0.68	-0.1000	0	-0.10				1.5
2297	-0.1000	0.0610	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	3.75	-0.1000	253	0.09	8.07	0	0	4.4
2298	-0.1000	0.0529	-0.1000	-0.1000	-0.1000	0.0287	-0.1000	0.4	-0.1000	3.92	-0.1000	224	0.05	8.07	0	0	4.0
2299	-0.1000	0.0560	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	12.59	-0.1000	572	0.22	8.13	0	0	4.7
2300	-0.1000	0.0552	-0.1000	-0.1000	-0.1000	0.0217	-0.1000	0.4	-0.1000	3.75	-0.1000	261	0.14	7.99	0	0	4.3
2301	-0.1000	0.0522	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.6	-0.1000	5.11	-0.1000	275	-0.10	7.99	0	0	4.6
2302	-0.1000	0.0589	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.5	-0.1000	3.67	-0.1000	268	-0.10	7.97	1	0	4.4
2303	-0.1000	0.0942	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.4	-0.1000	6.05	-0.1000	220	-0.10	7.23	1	0	3.0
2304	-0.1000	0.0410	-0.1000	-0.1000	-0.1000	0.2020	-0.1000	-0.1	-0.1000	1.78	-0.1000	157	-0.10	7.95	1	0	1.8
2305	-0.1000	0.0215	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.2	-0.1000	3.52	-0.1000	196	-0.10	7.76	0	0	3.2
2306	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.8	-0.1000	4.63	-0.1000	125	-0.10	7.71	1	0	1.6
2307	-0.1000	0.1180	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.8	-0.1000	6.05	-0.1000	440	-0.10	7.54	1	0	7.4
2310	-0.1000	0.1869	-0.1000	-0.1000	-0.1000	0.0440	0.0511	-0.1	-0.1000	0.51	-0.1000	206	-0.10	8.89	0	0	1.5

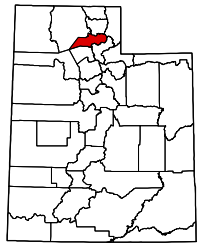
Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 8. Weber District



Map Scale 1:195,288 (1 inch = 3.1 miles)

District Location



- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

Zone 3

UACD Zone 3 consists of five districts in three counties, including Summit, Utah, and Wasatch counties.

Forty-eight sites were sampled in the five districts of Zone 3 during the spring, summer, and fall of 2002. Two were sampled in the Alpine District, three in the Kamas District, forty-two in the Timp-Nebo District, and four in the Wasatch District. A separate narrative report is presented for each district with maps showing the location of the sample sites. Each report covers three categories of water quality criteria: irrigation, livestock and culinary. Data are presented in four tables for each zone, grouped according to district, general parameters (temperature, pH, total dissolved solids (TDS), and chemicals for which there are no standards); irrigation, livestock and drinking water parameters.

Alpine District

Two samples were collected in the Alpine District. Water varies from moderate to hard, with grains per gallon (gpg) ranging from 6.0 to 7.1 with a mean of 6.5. Sampled water temperature ranges from 11.2 °C to 12.1°C, with a mean of 11.65 °C. The pH for the area has a mean of 8.04 and ranges from 7.89 to 8.19.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2152 exceeds the acceptable salinity standard of 750 µmhos/cm.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Neither sample shows elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Sample 2152 exceeds the

EPA aesthetic salinity standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

No samples were found to be contaminated with coliform.

Sample Site Test Data for Alpine District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2152	-0.1000	68.69	1.95	-0.1000	34.20	81.03	-0.10	7.89	11.2	601
2295	-0.1000	88.16	2.09	-0.1000	32.66	17.42	-0.10	8.19	12.1	409

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2152	-0.1000	0.09	131.59	-0.10	-0.1000	0.0912	4.77	-0.1000	-0.1000	-0.10	2.0	1,002
2295	-0.1000	-0.10	55.25	-0.10	-0.1000	-0.1000	4.25	-0.1000	-0.1000	-0.10	0.4	682

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.
Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2152	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	26.31	-0.1000	601	-0.1000	-0.10
2295	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.64	-0.1000	409	-0.1000	-0.10

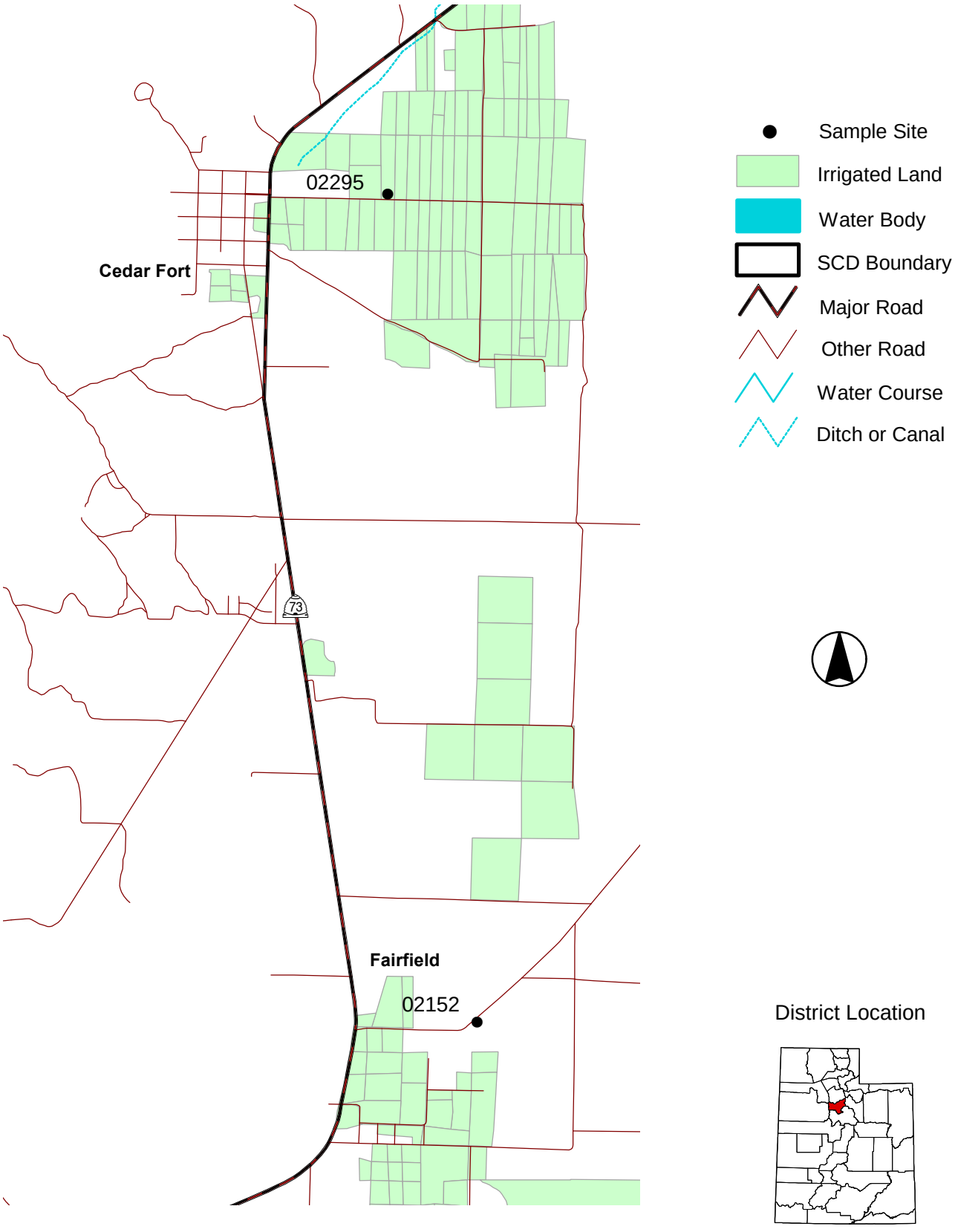
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2152	-0.1000	0.0614	-0.1000	-0.1000	-0.1000	0.0912	-0.1000	1.2	-0.1000	26.31	-0.1000	601	-0.10	7.89	0	0	6.0
2295	-0.1000	0.1003	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.9	-0.1000	27.64	-0.1000	409	-0.10	8.19	0	0	7.1

detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 9. Alpine District



Map Scale 1:45,000 (1 inch = 0.71 miles)

Kamas Valley District

Three samples were collected in the Kamas Valley District. Water tested moderate, with grains per gallon (gpg) ranging from 4.6 to 5.1 with a mean of 4.8. Sampled water temperature ranges from 11.2°C to 19.1°C, with a mean of 14.5 °C. The pH for the area has a mean of 7.76 and ranges from 7.63 to 7.83.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. No samples exceeded the salinity standard of 750 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. No samples exceeded the SAR standard of 3.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

No elements were found in concentrations harmful to plants.

Livestock:

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. No samples exceed the EPA aesthetic standard of 500 ppm above which the water may be off-flavored, but it is not a health problem until TDS exceeds 2,000 ppm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2193 and 2194 are contaminated with coliform.

Sample Site Test Data for Kamas Valley District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2191	-0.1000	54.37	1.65	-0.1000	32.08	22.69	-0.10	7.93	19.1	236
2193	-0.1000	64.88	1.40	-0.1000	14.40	24.13	-0.10	7.63	13.2	311
2194	-0.1000	56.01	2.53	0.0936	25.73	59.43	-0.10	7.73	11.2	433

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2191	-0.1000	0.07	8.97	-0.10	-0.1000	0.0437	3.49	-0.1000	-0.1000	0.12	0.6	394
2193	-0.1000	-0.10	41.34	-0.10	0.0303	0.0758	4.04	-0.1000	-0.1000	0.17	0.7	519
2194	-0.1000	0.08	88.88	-0.10	-0.1000	-0.1000	4.38	-0.1000	-0.1000	-0.10	1.6	721

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.
Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2191	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	32.71	-0.1000	236	-0.1000	0.12
2193	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.64	-0.1000	311	-0.1000	0.17
2194	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.66	-0.1000	433	-0.1000	-0.10

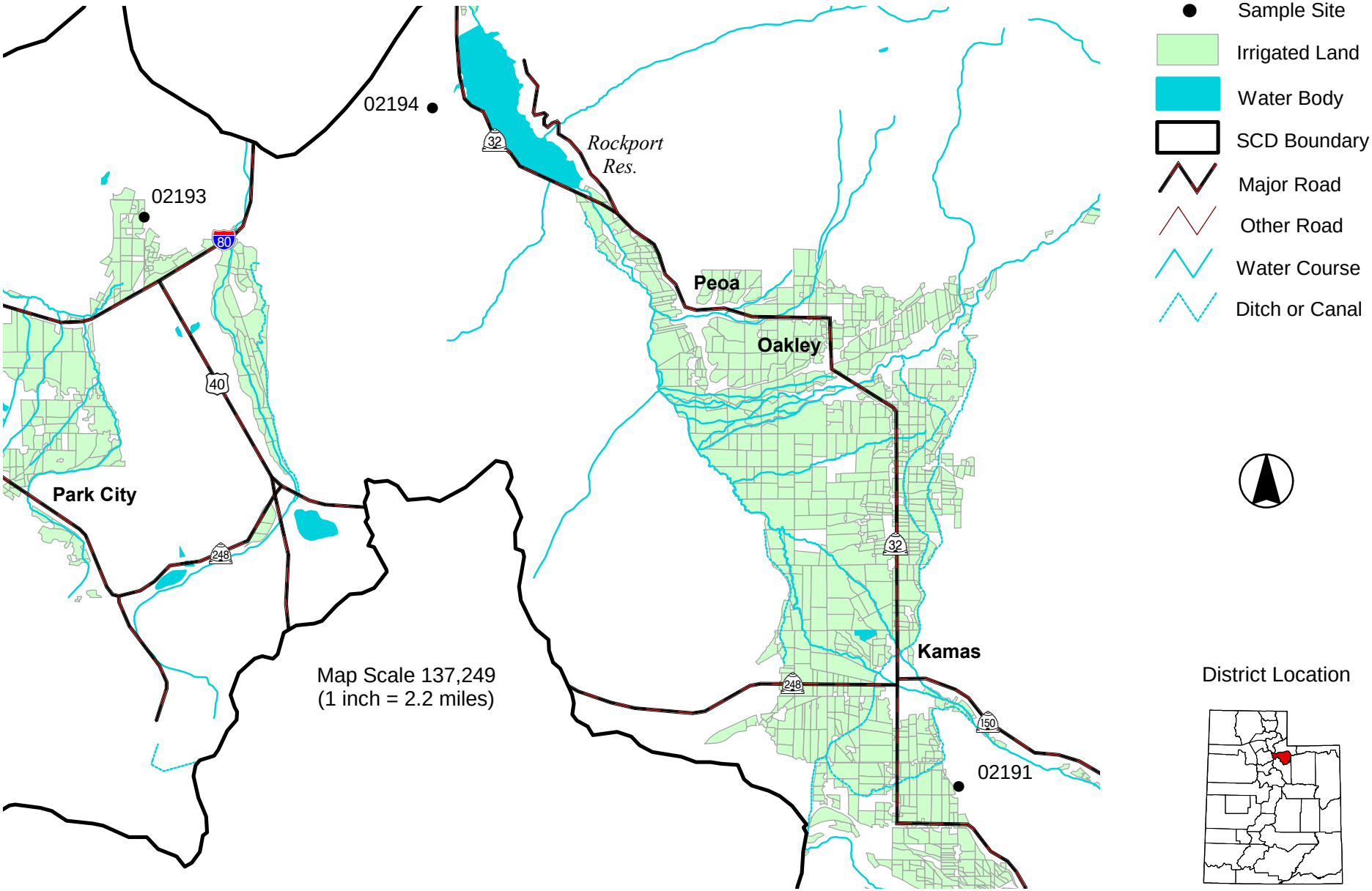
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2191	-0.1000	0.0562	-0.1000	-0.1000	-0.1000	0.0437	-0.1000	1.4	-0.1000	32.71	-0.1000	236	0.12	7.93	0	0	5.1
2193	-0.1000	0.1865	-0.1000	-0.1000	0.0303	0.0758	-0.1000	0.6	-0.1000	4.64	-0.1000	311	0.17	7.63	1	0	4.6
2194	-0.1000	0.3531	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.4	-0.1000	8.66	-0.1000	433	-0.10	7.73	1	0	4.8

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 10. Kamas Valley District



Timp-Nebo District

Water in the Timp-Nebo District varies from soft to very hard, with grains per gallon (gpg) ranging from 3.0 to 16.6 with a mean of 6.02. Sampled water temperature ranges from 12.4 °C to 23.4 °C, with a mean of 15.77 °C. The pH for the area has a mean of 8.02 and ranges from 7.75 to 8.51. Sample 2148 has high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Samples 2085, 2139, 2179, 2241, 2242, and 2314 through 2317 exceed the salinity standard of 750 µmhos/cm. Sample 2242 exceeds the severe-injury level of 3,000 µmhos/cm, which would affect most plants.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2179, 2241, 2242, and 2317 have elevated SAR.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Chlorine found in the form of chloride (Cl^-) can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2179 and 2314 through 2317 have high chlorine. Sample 2179 also exceeds the 355 ppm level and can cause severe damage.

No other elements were found in concentrations harmful to plants.

Livestock:

Samples 2179, 2242, and 2317 have elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Samples 2085, 2139, 2179, 2241, 2242, and 2314 through 2317 exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm.

Three elements, iron (Fe), manganese (Mn), and sulfur (S) were found to exceed the aesthetic drinking water quality standard. Samples 2145 and 2151 have high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Four samples, including 2080, 2151, 2242, and 2317, have high manganese concentrations, above the EPA aesthetic standard of 0.05 ppm. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Sample 2242 also has high sulfur. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

Samples 2241 and 2242 exceed the EPA nitrate (NO_3) standard of 10 ppm nitrate expressed as nitrogen (NO_3-N). NO_3 is an important nutrient for plant growth. It is found in nitrogen fertilizers, manure, septic systems, and some minerals. NO_3 is toxic to young infants (usually less than 6 months of age) and causes “blue baby syndrome.” NO_3 can only be removed from water by reverse osmosis or distillation.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2081, 2082, 2089, 2315, and 2316 are contaminated with coliform bacteria.

Sample Site Test Data for Timp-Nebo District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2080	-0.1000	54.12	4.54	-0.1000	27.51	17.53	-0.10	8.27	14.7	329
2081	-0.1000	69.44	5.40	-0.1000	31.95	13.62	-0.10	8.02	13.6	376
2082	-0.1000	54.05	3.39	-0.1000	26.20	17.85	-0.10	8.12	14.4	322
2083	-0.1000	57.08	4.39	-0.1000	26.90	19.19	-0.10	8.11	13.3	336
2084	-0.1000	74.19	5.24	-0.1000	36.48	34.52	-0.10	7.85	13.9	448
2085	-0.1000	98.29	6.39	-0.1000	38.73	52.44	-0.10	7.75	15.0	546
2086	-0.1000	80.53	3.93	-0.1000	29.08	16.97	-0.10	7.92	14.5	403
2087	-0.1000	77.81	3.72	-0.1000	28.12	13.35	-0.10	7.96	14.7	374
2088	-0.1000	73.99	2.37	-0.1000	26.77	25.67	-0.10	7.93	15.6	379
2089	-0.1000	33.23	4.41	-0.1000	18.22	12.96	-0.10	8.35	13.1	214
2090	-0.1000	47.55	2.65	-0.1000	23.55	17.22	-0.10	8.15	14.2	284
2091	-0.1000	49.86	2.56	-0.1000	23.80	17.65	-0.10	8.17	14.6	298
2092	-0.1000	42.50	2.60	-0.1000	19.84	13.11	-0.10	8.30	13.6	246
2093	-0.1000	84.16	3.44	-0.1000	28.70	32.81	-0.10	7.93	13.4	438
2094	-0.1000	69.56	6.01	-0.1000	36.15	27.22	-0.10	8.09	12.4	415
2095	-0.1000	76.52	2.23	-0.1000	27.22	33.60	-0.10	7.89	14.1	406
2096	-0.1000	59.95	2.13	-0.1000	23.12	13.25	-0.10	8.02	14.0	305
2097	-0.1000	77.08	2.24	-0.1000	26.96	35.72	-0.10	7.85	15.6	413
2098	-0.1000	73.86	2.27	-0.1000	26.95	34.80	-0.10	7.82	14.2	411
2099	-0.1000	78.15	2.15	-0.1000	27.78	29.73	-0.10	7.85	14.3	402
2139	-0.1000	92.78	3.77	-0.1000	36.87	42.92	-0.10	7.77	15.0	504
2140	-0.1000	74.60	1.85	-0.1000	27.84	6.78	-0.10	7.90	17.3	337
2141	-0.1000	53.56	2.61	-0.1000	26.75	18.20	-0.10	8.03	13.9	324
2142	-0.1000	40.79	2.90	-0.1000	21.81	11.15	-0.10	7.92	15.5	239
2143	-0.1000	59.69	1.97	-0.1000	23.10	10.19	-0.10	7.94	15.5	286
2144	-0.1000	43.95	2.79	-0.1000	23.06	14.69	-0.10	8.09	13.8	270
2145	-0.1000	71.61	2.18	-0.1000	26.66	13.61	-0.10	7.85	17.9	352
2146	-0.1000	77.08	2.30	-0.1000	29.09	20.65	-0.10	7.85	15.0	386
2147	-0.1000	89.72	3.79	-0.1000	36.75	18.61	-0.10	7.90	13.8	445
2148	-0.1000	40.30	3.39	-0.1000	17.95	9.27	-0.10	8.51	17.1	226
2149	-0.1000	40.67	3.46	-0.1000	18.04	9.25	-0.10	8.22	16.0	224
2150	-0.1000	70.63	4.76	-0.1000	32.88	18.71	-0.10	8.00	14.7	400
2151	-0.1000	68.23	2.27	-0.1000	22.98	23.33	-0.10	8.05	17.6	367
2179	-0.1000	100.63	27.54	0.1430	59.33	220.77	-0.10	7.85	17.9	1236
2241	-0.1000	196.18	17.37	0.2918	87.10	205.66	-0.10	8.12	21.9	1608
2242	-0.1000	96.53	48.44	0.4759	47.36	489.44	-0.10	8.22	19.1	1878
2243	-0.1000	75.46	1.29	-0.1000	27.07	11.35	-0.10	8.13	14.1	352
2244	-0.1000	67.22	1.27	-0.1000	24.87	9.57	-0.10	8.12	13.3	317
2314	-0.1000	66.86	11.04	0.1991	35.44	113.26	-0.10	7.89	23.4	660
2315	-0.1000	82.20	12.67	0.2415	39.43	129.92	-0.10	7.88	22.3	750
2316	-0.1000	79.85	12.72	0.2439	38.04	128.99	-0.10	8.15	21.7	922
2317	-0.1000	90.52	12.59	0.2410	54.66	158.19	-0.10	8.34	22.4	747

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Timp-Nebo District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2080	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.2942	4.02	0.1199	-0.1000	1.60	0.5	548
2081	-0.1000	-0.10	26.01	-0.10	-0.1000	-0.1000	4.35	-0.1000	-0.1000	-0.10	0.3	626
2082	-0.1000	-0.10	24.36	-0.10	-0.1000	-0.1000	3.74	-0.1000	-0.1000	-0.10	0.5	537
2083	-0.1000	-0.10	25.98	-0.10	0.0231	0.0277	3.92	-0.1000	-0.1000	0.06	0.5	560
2084	-0.1000	0.11	24.68	-0.10	-0.1000	-0.1000	5.80	-0.1000	-0.1000	-0.10	0.8	747
2085	-0.1000	0.14	31.48	-0.10	-0.1000	-0.1000	6.73	-0.1000	-0.1000	0.23	1.1	910
2086	-0.1000	-0.10	31.41	-0.10	-0.1000	0.0250	4.87	-0.1000	-0.1000	-0.10	0.4	672
2087	-0.1000	-0.10	28.26	-0.10	-0.1000	-0.1000	4.69	-0.1000	-0.1000	0.18	0.3	623
2088	0.0734	-0.10	29.49	-0.10	-0.1000	-0.1000	4.81	-0.1000	-0.1000	-0.10	0.7	631
2089	-0.1000	-0.10	7.50	-0.10	-0.1000	0.0493	3.05	-0.1000	-0.1000	0.16	0.4	357
2090	-0.1000	-0.10	30.32	-0.10	-0.1000	0.1356	3.47	-0.1000	-0.1000	0.22	0.5	473
2091	0.0556	-0.10	31.45	-0.10	-0.1000	0.0687	3.55	-0.1000	-0.1000	0.06	0.5	496
2092	0.0732	-0.10	16.47	-0.10	-0.1000	0.0964	3.26	-0.1000	-0.1000	0.05	0.4	410
2093	-0.1000	-0.10	37.78	-0.10	-0.1000	0.0307	3.49	-0.1000	-0.1000	0.06	0.8	730
2094	-0.1000	0.10	20.62	-0.10	-0.1000	-0.1000	5.57	-0.1000	-0.1000	-0.10	0.7	692
2095	-0.1000	-0.10	35.79	-0.10	-0.1000	0.0696	5.24	-0.1000	-0.1000	0.79	0.8	676
2096	-0.1000	-0.10	22.66	-0.10	-0.1000	0.0643	3.88	-0.1000	-0.1000	0.67	0.4	509
2097	-0.1000	-0.10	37.51	-0.10	-0.1000	-0.1000	5.24	-0.1000	-0.1000	0.11	0.9	688
2098	-0.1000	-0.10	38.61	-0.10	0.0216	0.1691	5.01	-0.1000	-0.1000	0.42	0.9	685
2099	0.0494	-0.10	31.83	-0.10	0.0276	0.0238	5.18	-0.1000	-0.1000	0.08	0.7	670
2139	-0.1000	0.15	79.44	-0.10	-0.1000	0.2391	5.55	-0.1000	-0.1000	0.18	1.0	840
2140	-0.1000	-0.10	18.85	-0.10	0.0274	0.0233	4.69	-0.1000	-0.1000	1.01	0.2	562
2141	-0.1000	-0.10	43.05	-0.10	-0.1000	-0.1000	3.76	-0.1000	-0.1000	-0.10	0.5	540
2142	-0.1000	-0.10	15.92	-0.10	-0.1000	0.0636	3.41	-0.1000	-0.1000	0.18	0.4	398
2143	-0.1000	-0.10	15.42	-0.10	-0.1000	-0.1000	4.11	-0.1000	-0.1000	-0.10	0.3	476
2144	-0.1000	-0.10	28.62	-0.10	-0.1000	0.0397	3.41	-0.1000	-0.1000	-0.10	0.4	450
2145	-0.1000	-0.10	20.60	-0.10	-0.1000	0.3977	4.66	-0.1000	-0.1000	-0.10	0.3	587
2146	-0.1000	-0.10	24.46	-0.10	-0.1000	-0.1000	5.08	-0.1000	-0.1000	-0.10	0.5	643
2147	-0.1000	-0.10	30.72	-0.10	-0.1000	0.2205	5.59	-0.1000	-0.1000	-0.10	0.4	741
2148	-0.1000	-0.10	9.59	-0.10	-0.1000	-0.1000	3.22	-0.1000	-0.1000	-0.10	0.3	376
2149	-0.1000	-0.10	9.62	-0.10	-0.1000	0.0498	3.12	-0.1000	-0.1000	-0.10	0.3	373
2150	-0.1000	-0.10	30.69	-0.10	-0.1000	0.0606	4.99	-0.1000	-0.1000	-0.10	0.5	666
2151	-0.1000	-0.10	22.61	-0.10	-0.1000	1.2604	4.56	0.1370	-0.1000	-0.10	0.6	611
2179	-0.1000	0.51	526.46	-0.10	-0.1000	0.2301	4.35	0.0399	-0.1000	0.44	4.3	2,060
2241	-0.1000	0.32	-0.10	-0.10	0.0251	0.0314	3.43	-0.1000	-0.1000	0.05	3.1	2,680
2242	-0.1000	0.30	-0.10	-0.10	-0.1000	-0.1000	4.38	0.0574	-0.1000	0.13	10.2	3,130
2243	-0.1000	-0.10	18.83	-0.10	0.0396	-0.1000	5.02	-0.1000	-0.1000	-0.10	0.3	586
2244	-0.1000	-0.10	18.15	-0.10	-0.1000	-0.1000	4.64	-0.1000	-0.1000	-0.10	0.3	529
2314	-0.1000	0.30	182.69	-0.10	-0.1000	0.0252	4.31	-0.1000	-0.1000	-0.10	2.8	1,100
2315	-0.1000	0.33	222.68	-0.10	-0.1000	0.0201	4.38	-0.1000	-0.1000	-0.10	2.9	1,250
2316	-0.1000	0.33	221.14	-0.10	-0.1000	0.0210	4.46	-0.1000	-0.1000	-0.10	3.0	1,536
2317	-0.1000	0.43	271.80	-0.10	-0.1000	0.1462	4.15	0.1926	-0.1000	-0.10	3.2	1,245

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Timp-Nebo District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2080	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.38	-0.1000	329	-0.1000	1.60
2081	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.27	-0.1000	376	-0.1000	-0.10
2082	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.37	-0.1000	322	-0.1000	-0.10
2083	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.81	-0.1000	336	-0.1000	0.06
2084	-0.1000	-0.1000	0.1069	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.98	-0.1000	448	-0.1000	-0.10
2085	-0.1000	-0.1000	0.1430	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	31.63	-0.1000	546	-0.1000	0.23
2086	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.22	-0.1000	403	-0.1000	-0.10
2087	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.66	-0.1000	374	-0.1000	0.18
2088	0.0734	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.84	-0.1000	379	-0.1000	-0.10
2089	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.49	-0.1000	214	-0.1000	0.16
2090	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.39	-0.1000	284	-0.1000	0.22
2091	0.0556	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.88	-0.1000	298	-0.1000	0.06
2092	0.0732	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.72	-0.1000	246	-0.1000	0.05
2093	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.96	-0.1000	438	-0.1000	0.06
2094	-0.1000	-0.1000	0.1010	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.09	-0.1000	415	-0.1000	-0.10
2095	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.93	-0.1000	406	-0.1000	0.79
2096	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.94	-0.1000	305	-0.1000	0.67
2097	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.51	-0.1000	413	-0.1000	0.11
2098	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.07	-0.1000	411	-0.1000	0.42
2099	0.0494	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.83	-0.1000	402	-0.1000	0.08
2139	-0.1000	-0.1000	0.1535	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.63	-0.1000	504	-0.1000	0.18
2140	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.06	-0.1000	337	-0.1000	1.01
2141	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.52	-0.1000	324	-0.1000	-0.10
2142	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.36	-0.1000	239	-0.1000	0.18
2143	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.42	-0.1000	286	-0.1000	-0.10
2144	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.00	-0.1000	270	-0.1000	-0.10
2145	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.84	-0.1000	352	-0.1000	-0.10
2146	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.64	-0.1000	386	-0.1000	-0.10
2147	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	25.08	-0.1000	445	-0.1000	-0.10
2148	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.98	-0.1000	226	-0.1000	-0.10
2149	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.04	-0.1000	224	-0.1000	-0.10
2150	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	20.47	-0.1000	400	-0.1000	-0.10
2151	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.69	-0.1000	367	-0.1000	-0.10
2179	-0.1000	-0.1000	0.5123	-0.1000	-0.1000	-0.1000	0.0164	-0.1000	-0.1000	36.94	-0.1000	1,236	-0.1000	0.44
2241	-0.1000	-0.1000	0.3241	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	66.88	-0.1000	1,608	-0.1000	0.05
2242	-0.1000	-0.1000	0.3011	-0.1000	-0.1000	-0.1000	0.0108	-0.1000	-0.1000	104.15	-0.1000	1,878	-0.1000	0.13
2243	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.58	-0.1000	352	-0.1000	-0.10
2244	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.31	-0.1000	317	-0.1000	-0.10
2314	-0.1000	-0.1000	0.2978	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	31.26	-0.1000	660	-0.1000	-0.10
2315	-0.1000	-0.1000	0.3276	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.47	-0.1000	750	-0.1000	-0.10
2316	-0.1000	-0.1000	0.3272	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	35.56	-0.1000	922	-0.1000	-0.10
2317	-0.1000	-0.1000	0.4316	-0.1000	-0.1000	-0.1000	0.0172	0.1252	-0.1000	75.42	-0.1000	747	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

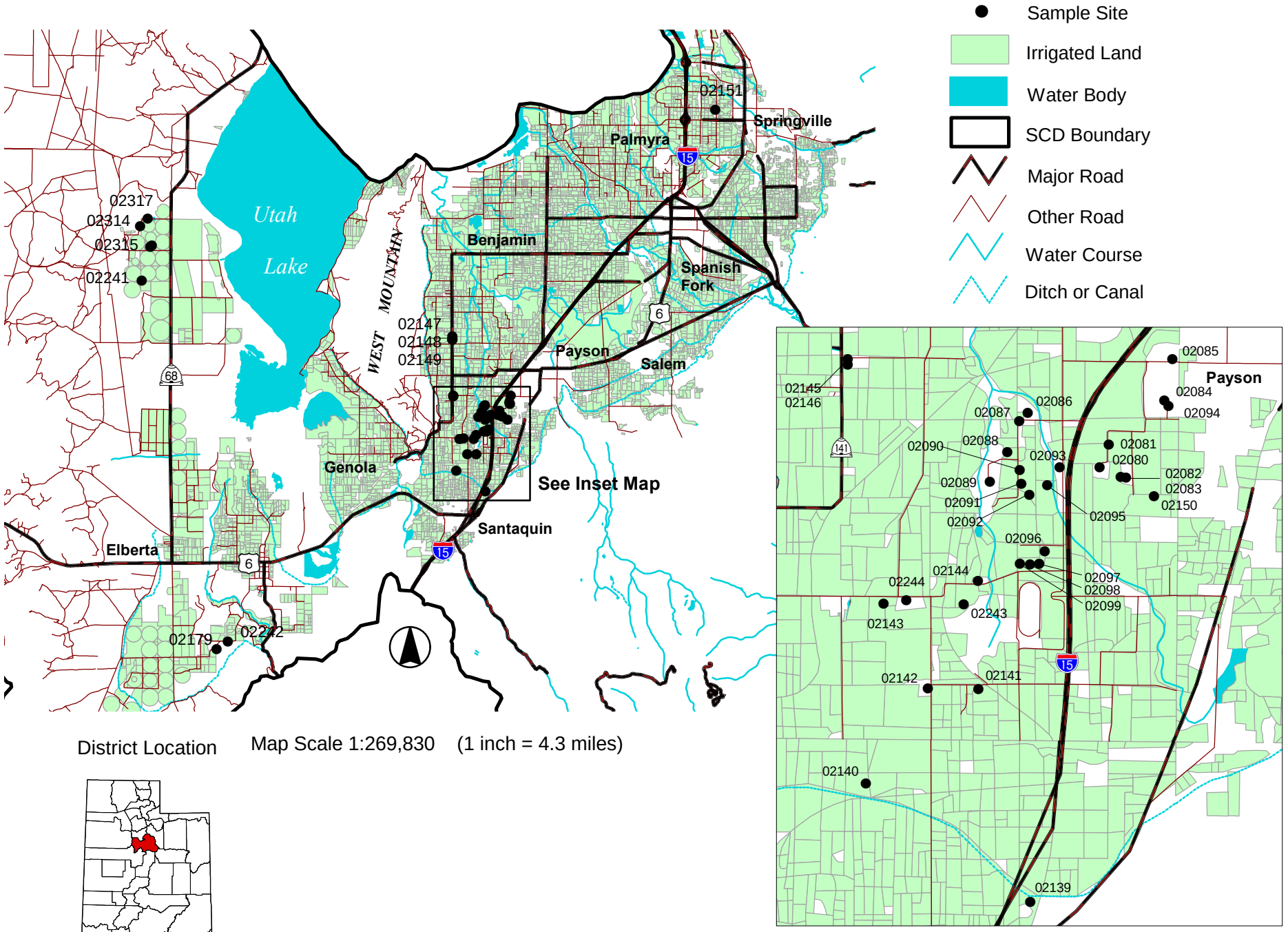
Sample Site Test Data for Timp-Nebo District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3 N	Pb	S	Se	TDS	Zn	pH	Col	Ecoli	Hard-ness gpg
2080	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	0.2942	0.1199	1.2	-0.1000	13.38	-0.1000	329	1.60	8.27	0	0	4.8
2081	-0.1000	0.1875	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.9	-0.1000	16.27	-0.1000	376	-0.10	8.02	1	0	5.9
2082	-0.1000	0.1517	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.6	-0.1000	15.37	-0.1000	322	-0.10	8.12	1	0	4.7
2083	-0.1000	0.1748	-0.1000	-0.1000	0.0231	0.0277	-0.1000	1.7	-0.1000	16.81	-0.1000	336	0.06	8.11	0	0	4.9
2084	-0.1000	0.0860	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.6	-0.1000	17.98	-0.1000	448	-0.10	7.85	0	0	6.5
2085	-0.1000	0.1255	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.0	-0.1000	31.63	-0.1000	546	0.23	7.75	0	0	8.0
2086	-0.1000	0.2158	-0.1000	-0.1000	-0.1000	0.0250	-0.1000	2.8	-0.1000	16.22	-0.1000	403	-0.10	7.92	0	0	6.4
2087	-0.1000	0.1857	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.2	-0.1000	15.66	-0.1000	374	0.18	7.96	0	0	6.2
2088	-0.1000	0.2584	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.1	-0.1000	13.84	-0.1000	379	-0.10	7.93	0	0	5.9
2089	-0.1000	0.1493	-0.1000	-0.1000	-0.1000	0.0493	-0.1000	0.6	-0.1000	5.49	-0.1000	214	0.16	8.35	1	0	3.0
2090	-0.1000	0.1947	-0.1000	-0.1000	-0.1000	0.1356	-0.1000	1.9	-0.1000	7.39	-0.1000	284	0.22	8.15	0	0	4.2
2091	-0.1000	0.2053	-0.1000	-0.1000	-0.1000	0.0687	-0.1000	2.0	-0.1000	7.88	-0.1000	298	0.06	8.17	0	0	4.3
2092	-0.1000	0.1136	-0.1000	-0.1000	-0.1000	0.0964	-0.1000	1.2	-0.1000	5.72	-0.1000	246	0.05	8.30	0	0	3.6
2093	-0.1000	0.2480	-0.1000	-0.1000	-0.1000	0.0307	-0.1000	3.9	-0.1000	16.96	-0.1000	438	0.06	7.93	0	0	6.6
2094	-0.1000	0.1225	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.8	-0.1000	17.09	-0.1000	415	-0.10	8.09	0	0	6.2
2095	-0.1000	0.3104	-0.1000	-0.1000	-0.1000	0.0696	-0.1000	4.0	-0.1000	14.93	-0.1000	406	0.79	7.89	0	0	6.1
2096	-0.1000	0.1822	-0.1000	-0.1000	-0.1000	0.0643	-0.1000	3.1	-0.1000	9.94	-0.1000	305	0.67	8.02	0	0	4.9
2097	-0.1000	0.2804	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.2	-0.1000	14.51	-0.1000	413	0.11	7.85	0	0	6.1
2098	-0.1000	0.1931	-0.1000	-0.1000	0.0216	0.1691	-0.1000	3.9	-0.1000	15.07	-0.1000	411	0.42	7.82	0	0	5.9
2099	-0.1000	0.2690	-0.1000	-0.1000	0.0276	0.0238	-0.1000	5.4	-0.1000	12.83	-0.1000	402	0.08	7.85	0	0	6.2
2139	-0.1000	0.1697	-0.1000	-0.1000	-0.1000	0.2391	-0.1000	3.6	-0.1000	15.63	-0.1000	504	0.18	7.77	0	0	7.6
2140	-0.1000	0.1515	-0.1000	-0.1000	0.0274	0.0233	-0.1000	4.3	-0.1000	8.06	-0.1000	337	1.01	7.90	0	0	6.0
2141	-0.1000	0.2693	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.9	-0.1000	7.52	-0.1000	324	-0.10	8.03	0	0	4.7
2142	-0.1000	0.1479	-0.1000	-0.1000	-0.1000	0.0636	-0.1000	0.4	-0.1000	5.36	-0.1000	239	0.18	7.92	0	0	3.7
2143	-0.1000	0.1075	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.6	-0.1000	8.42	-0.1000	286	-0.10	7.94	0	0	4.8
2144	-0.1000	0.1866	-0.1000	-0.1000	-0.1000	0.0397	-0.1000	1.1	-0.1000	6.00	-0.1000	270	-0.10	8.09	0	0	3.9
2145	-0.1000	0.1336	-0.1000	-0.1000	-0.1000	0.3977	-0.1000	3.5	-0.1000	13.84	-0.1000	352	-0.10	7.85	0	0	5.7
2146	-0.1000	0.1407	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.8	-0.1000	16.64	-0.1000	386	-0.10	7.85	0	0	6.2
2147	-0.1000	0.1793	-0.1000	-0.1000	-0.1000	0.2205	-0.1000	6.5	-0.1000	25.08	-0.1000	445	-0.10	7.90	0	0	7.4
2148	-0.1000	0.0812	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.8	-0.1000	5.98	-0.1000	226	-0.10	8.51	0	0	3.4
2149	-0.1000	0.0802	-0.1000	-0.1000	-0.1000	0.0498	-0.1000	0.8	-0.1000	6.04	-0.1000	224	-0.10	8.22	0	0	3.4
2150	-0.1000	0.1906	-0.1000	-0.1000	-0.1000	0.0606	-0.1000	2.2	-0.1000	20.47	-0.1000	400	-0.10	8.00	0	0	6.1
2151	-0.1000	0.1747	-0.1000	-0.1000	-0.1000	1.2604	0.1370	-0.1	-0.1000	19.69	-0.1000	367	-0.10	8.05	0	0	5.3
2179	-0.1000	0.0487	-0.1000	-0.1000	-0.1000	0.2301	0.0399	0.2	-0.1000	36.94	-0.1000	1,236	0.44	7.85	0	0	9.4
2241	-0.1000	0.0780	-0.1000	-0.1000	0.0251	0.0314	-0.1000	15.5	-0.1000	66.88	-0.1000	1,608	0.05	8.12	0	0	16.6
2242	-0.1000	0.0905	-0.1000	-0.1000	-0.1000	-0.1000	0.0574	16.4	-0.1000	104.15	-0.1000	1,878	0.13	8.22	0	0	8.4
2243	-0.1000	0.1316	-0.1000	-0.1000	0.0396	-0.1000	-0.1000	2.7	-0.1000	9.58	-0.1000	352	-0.10	8.13	0	0	6.0
2244	-0.1000	0.0988	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.0	-0.1000	8.31	-0.1000	317	-0.10	8.12	0	0	5.4
2314	-0.1000	0.0643	-0.1000	-0.1000	-0.1000	0.0252	-0.1000	0.2	-0.1000	31.26	-0.1000	660	-0.10	7.89	0	0	6.0
2315	-0.1000	0.0693	-0.1000	-0.1000	-0.1000	0.0201	-0.1000	1.3	-0.1000	36.47	-0.1000	750	-0.10	7.88	1	0	7.1
2316	-0.1000	0.0746	-0.1000	-0.1000	-0.1000	0.0210	-0.1000	1.0	-0.1000	35.56	-0.1000	922	-0.10	8.15	1	0	6.9
2317	-0.1000	0.0720	-0.1000	-0.1000	-0.1000	0.1462	0.1926	2.3	-0.1000	75.42	-0.1000	747	-0.10	8.34	0	0	8.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 11. Timp-Nebo District



District Location

Map Scale 1:269,830 (1 inch = 4.3 miles)

Map Scale 1:47,813 (1 inch = 0.75 miles)

Wasatch District

Four samples were collected in the Wasatch District. Water varies from soft to hard, with grains per gallon (gpg) ranging from 1.85 to 10.00 with a mean of 5.68. Sampled water temperature ranges from 10.3 °C to 13.9 °C, with a mean of 12.18 °C. The pH for the area has a mean of 7.79 and ranges from 7.44 to 8.18.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2131 exceeds the 750 µmhos/cm standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Sample 2131 exceeds the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

Sample 2131 also has high sulfur. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand,

indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2192 and 2296 are contaminated with coliform. Wells from which these samples were collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected. No E. coli was found in any samples from this area.

Sample Site Test Data for Wasatch District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2130	-0.1000	24.42	1.99	-0.1000	6.96	6.48	-0.10	8.03	10.3	122
2131	-0.1000	132.48	0.88	-0.1000	38.57	7.10	-0.10	7.44	13.6	530
2192	-0.1000	72.01	2.65	-0.1000	18.09	15.32	-0.10	7.51	13.9	332
2296	-0.1000	73.66	0.83	-0.1000	22.16	11.31	-0.10	8.18	10.9	320

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2130	0.0740	-0.10	-0.10	-0.10	-0.1000	0.0491	1.96	-0.1000	-0.1000	0.12	0.3	203
2131	-0.1000	-0.10	11.03	-0.10	-0.1000	0.0210	4.21	-0.1000	-0.1000	0.04	0.1	884
2192	-0.1000	-0.10	16.72	-0.10	-0.1000	-0.1000	2.37	-0.1000	-0.1000	-0.10	0.4	554
2296	-0.1000	-0.10	13.08	-0.10	-0.1000	-0.1000	4.33	-0.1000	-0.1000	-0.10	0.3	534

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2130	0.0740	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.98	-0.1000	122	-0.1000	0.12
2131	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	100.38	-0.1000	530	-0.1000	0.04
2192	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.64	-0.1000	332	-0.1000	-0.10
2296	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.65	-0.1000	320	-0.1000	-0.10

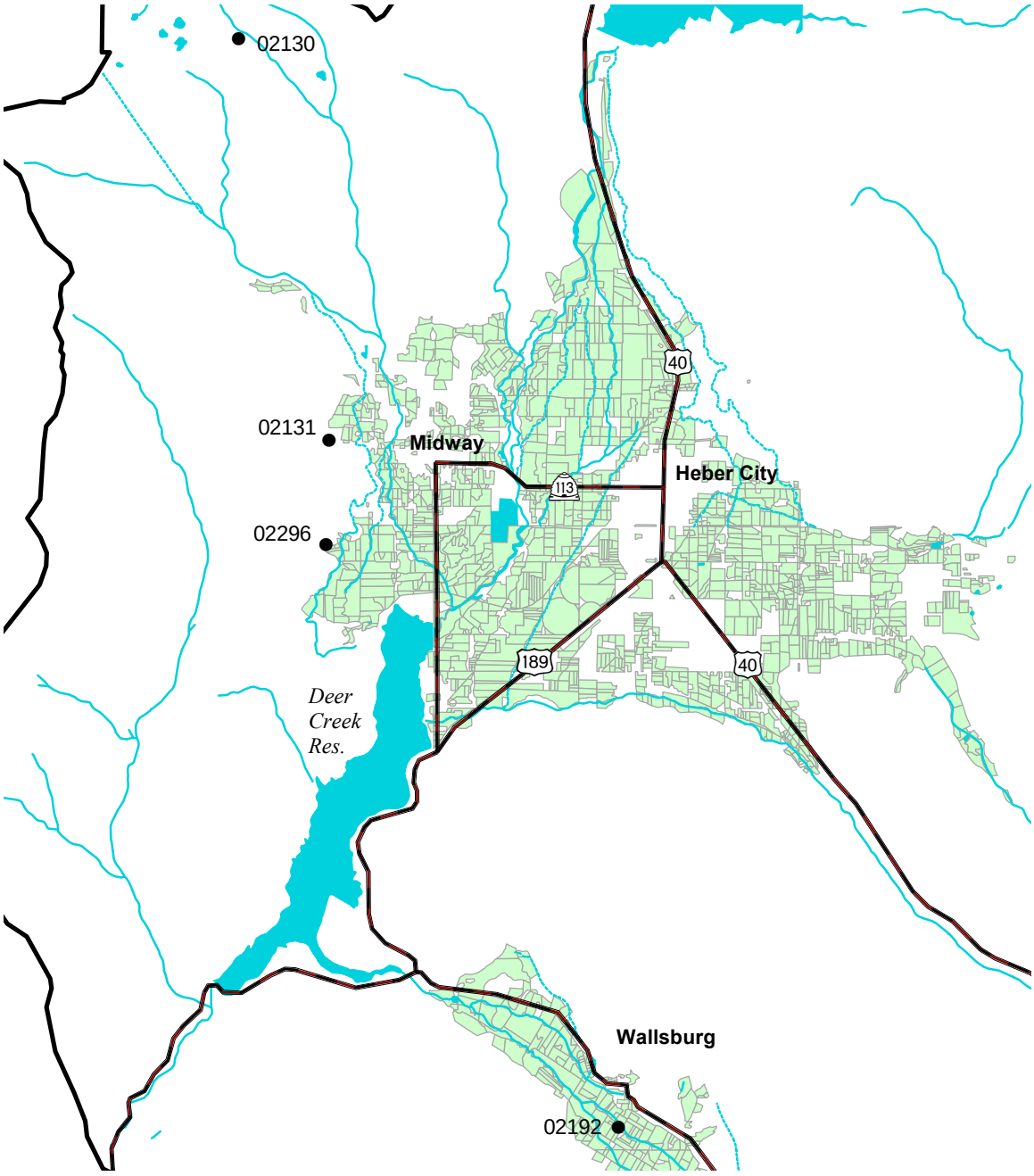
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2130	-0.1000	0.0362	-0.1000	-0.1000	-0.1000	0.0491	-0.1000	0.2	-0.1000	1.98	-0.1000	122	0.12	8.03	0	0	1.8
2131	-0.1000	0.0290	-0.1000	-0.1000	-0.1000	0.0210	-0.1000	0.2	-0.1000	100.38	-0.1000	530	0.04	7.44	0	0	10.0
2192	-0.1000	0.1158	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.5	-0.1000	11.64	-0.1000	332	-0.10	7.51	1	0	5.3
2296	-0.1000	0.0215	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	18.65	-0.1000	320	-0.10	8.18	1	0	5.6

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

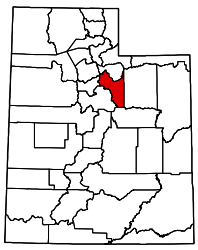
Map 12. Wasatch District



Map Scale 1:150,000 (1 inch = 2.4 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Zone 4

UACD Zone 4 consists of six districts in six counties including Juab, Millard, Piute, Sanpete, Sevier, and Wayne counties.

Fifty-two sites were sampled in Zone 4 during the spring, summer, and fall of 2002. These include seven in the Delta District, two in the Fremont District, eighteen in the Juab County District, twenty-three in the Millard District, and two in the Sanpete County District. Many of the Millard District wells were sampled as part of an ongoing agreement with the Division of Water Rights and Utah Department of Natural Resources. A narrative report is presented for these areas together with data tables and maps showing approximate locations of sampling sites. The report covers three categories of water quality criteria—irrigation, livestock and culinary.

Delta District

Water in the Delta District generally tested soft with grains per gallon (gpg) ranging from 0.37 to 2.7 and a mean of 1.0. Sampled water temperature ranges from 19.1 °C to 23.0 °C, with a mean of 20.3 °C. The pH for the area has a mean of 8.15 and ranges from 7.93 to 8.32.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2106 exceeds the 750 µmhos/cm standard.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2103 through 2106, 2108 and 2109 have elevated SAR values. Samples 2104, 2108, and 2109 have SAR values that exceed 9.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Chlorine found in the form of chloride (Cl^-) can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Sample 2106 has high chlorine, which at 167.16 ppm exceeds the 145 ppm level.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. The EPA aesthetic standard for salinity is 500 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm μmhos/cm. TDS for sample 2106 is 678 ppm exceeds the aesthetic standard of 500 ppm.

Samples 2106, 2108, and 2109 exceed the EPA standard for Arsenic (As) and should not be used for drinking water.

Sample 2109 has high iron (Fe). This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 2106 is contaminated with coliform (Col.).

Sample Site Test Data for Delta District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2103	-0.1000	7.09	1.10	-0.1000	2.98	90.59	-0.10	8.12	19.1	268
2104	-0.1000	5.24	1.16	0.0691	2.74	148.17	-0.10	8.25	19.2	404
2105	-0.1000	12.16	1.43	-0.1000	6.37	112.39	-0.10	7.93	23.0	371
2106	-0.1000	30.33	2.26	-0.1000	16.18	178.47	-0.10	7.93	19.6	678
2108	-0.1000	4.28	0.94	-0.1000	2.05	132.62	-0.10	8.31	21.7	343
2109	-0.1000	4.21	0.90	-0.1000	2.16	133.80	-0.10	8.32	19.0	340
2157	-0.1000	15.11	2.45	-0.1000	9.40	43.22	-0.10	8.21	20.7	204

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2103	-0.1000	0.12	40.07	-0.10	-0.1000	-0.1000	2.50	-0.1000	-0.1000	-0.10	7.2	446
2104	0.0562	0.27	75.48	-0.10	-0.1000	0.0619	3.55	-0.1000	-0.1000	-0.10	13.1	674
2105	-0.1000	0.17	81.05	-0.10	-0.1000	0.1192	2.27	-0.1000	-0.1000	0.06	6.5	619
2106	-0.1000	0.30	167.16	-0.10	-0.1000	0.0244	1.71	-0.1000	-0.1000	-0.10	6.5	1,130
2108	-0.1000	0.20	49.05	-0.10	0.0243	0.0468	3.69	-0.1000	-0.1000	0.05	13.2	572
2109	-0.1000	0.22	45.50	-0.10	-0.1000	0.4309	3.94	-0.1000	-0.1000	-0.10	13.2	567
2157	-0.1000	0.08	27.93	-0.10	-0.1000	0.1345	2.10	-0.1000	-0.1000	-0.10	2.2	340

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Delta District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2103	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.88	-0.1000	268	-0.1000	-0.10
2104	0.0562	0.0474	0.27	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.97	-0.1000	404	-0.1000	-0.10
2105	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.03	-0.1000	371	-0.1000	0.06
2106	-0.1000	0.0913	0.30	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	78.14	-0.1000	678	-0.1000	-0.10
2108	-0.1000	0.1193	0.20	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.94	-0.1000	343	-0.1000	0.05
2109	-0.1000	0.1390	0.22	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.78	-0.1000	340	-0.1000	-0.10
2157	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.72	-0.1000	204	-0.1000	-0.10

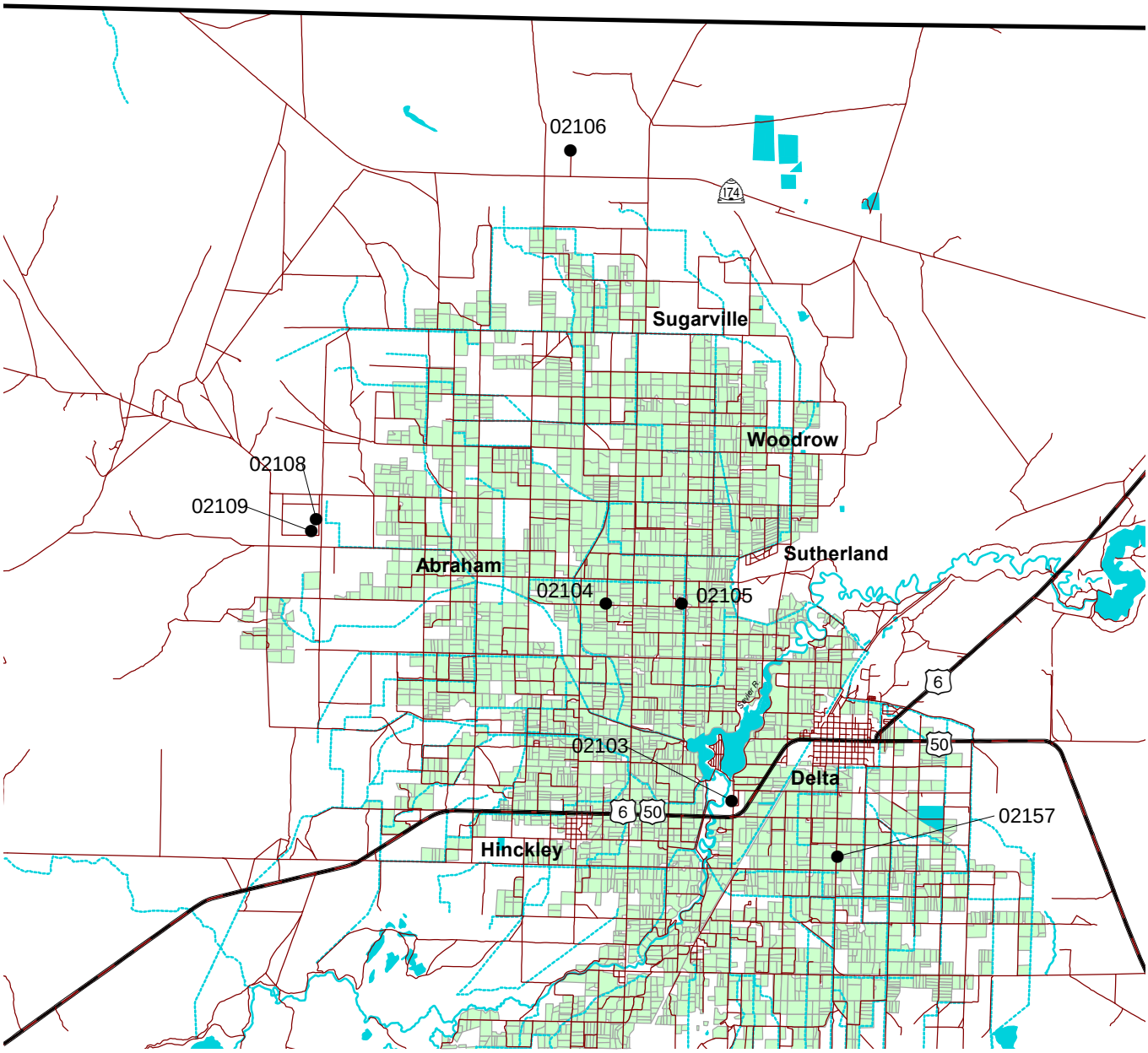
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2103	-0.1000	0.0238	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	9.88	-0.1000	268	-0.10	8.12	0	0	0.6
2104	0.0474	0.0338	-0.1000	-0.1000	-0.1000	0.0619	-0.1000	-0.1	-0.1000	15.97	-0.1000	404	-0.10	8.25	0	0	0.5
2105	-0.1000	0.0685	-0.1000	-0.1000	-0.1000	0.1192	-0.1000	-0.1	-0.1000	23.03	-0.1000	371	0.06	7.93	0	0	1.1
2106	0.0913	0.0442	-0.1000	-0.1000	-0.1000	0.0244	-0.1000	0.2	-0.1000	78.14	-0.1000	678	-0.10	7.93	1	0	2.7
2108	0.1193	0.0272	-0.1000	-0.1000	0.0243	0.0468	-0.1000	0.2	-0.1000	13.94	-0.1000	343	0.05	8.31	0	0	0.4
2109	0.1390	-0.1000	-0.1000	-0.1000	-0.1000	0.4309	-0.1000	-0.1	-0.1000	11.78	-0.1000	340	-0.10	8.32	0	0	0.4
2157	-0.1000	0.0388	-0.1000	-0.1000	-0.1000	0.1345	-0.1000	-0.1	-0.1000	6.72	-0.1000	204	-0.10	8.21	0	0	1.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

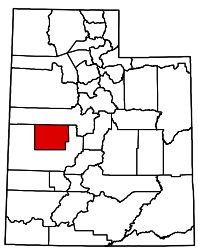
Map 13. Delta District



Map Scale 1:198,055 (1 inch = 3.13 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Fremont River District

Two samples were collected in the Fremont River District. Water tested soft, with grains per gallon (gpg) ranging from 1.6 to 3.4 with a mean of 2.52. Sampled water temperature ranges from 14.0 °C to 15.0 °C, with a mean of 14.5 °C. The pH for the area has a mean of 7.78 and ranges from 7.64 to 7.92.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Neither sample in this district exceeds the 750 µmhos/cm standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Neither sample has elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l, and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Coliform bacteria were detected in sample 2336.

Sample Site Test Data for Fremont River District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2336	-0.1000	17.49	3.04	-0.1000	10.69	6.25	-0.10	7.92	14.0	223
2337	-0.1000	50.22	0.42	-0.1000	7.83	10.94	-0.10	7.64	15.0	416

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2336	-0.1000	-0.10	10.09	-0.10	-0.1000	-0.1000	1.57	-0.1000	-0.1000	-0.10	0.3	371
2337	-0.1000	-0.10	15.83	-0.10	-0.1000	-0.1000	1.51	-0.1000	-0.1000	-0.10	0.4	693

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2336	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.68	-0.1000	223	-0.1000	-0.10
2337	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	37.52	-0.1000	416	-0.1000	-0.10

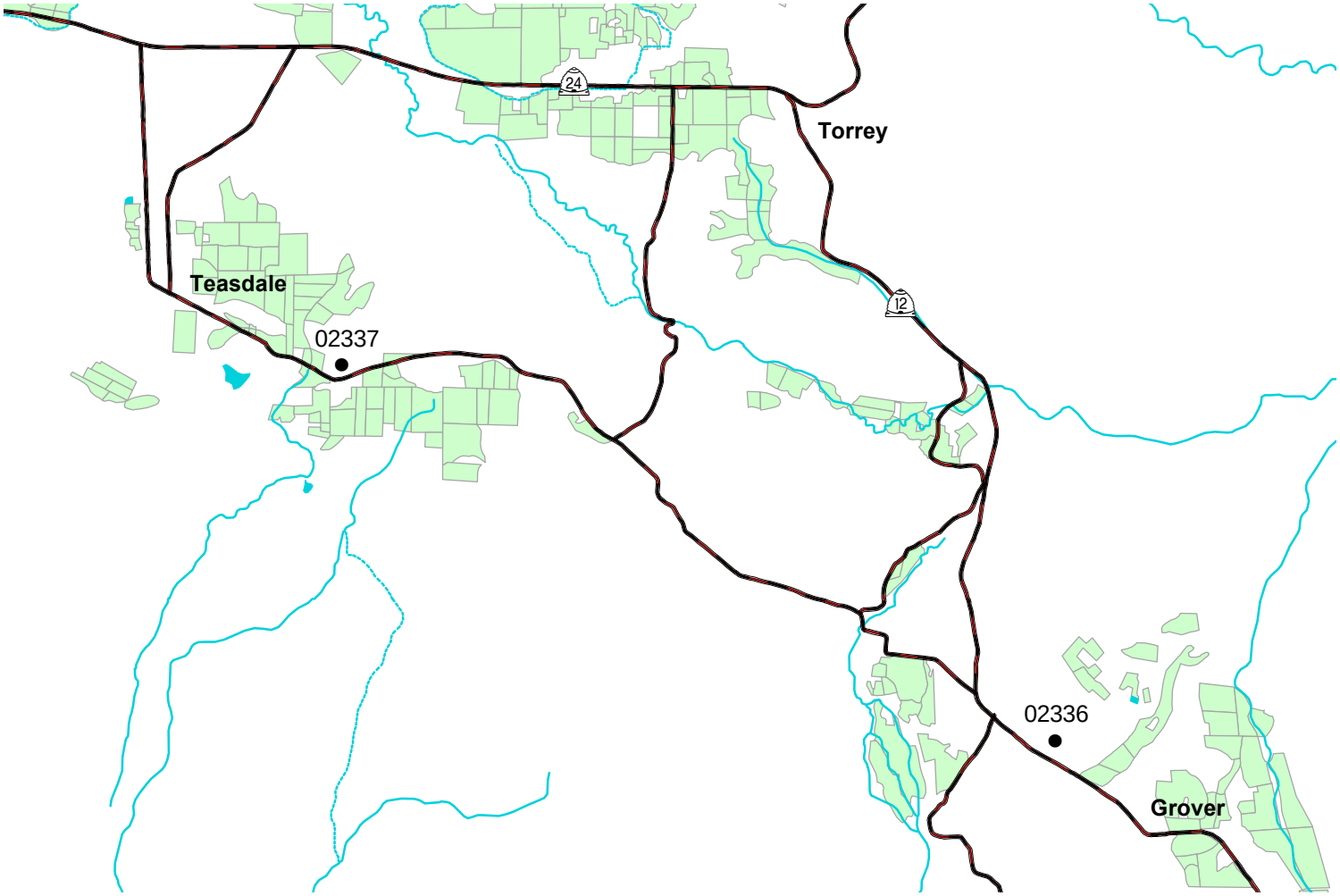
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2336	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	4.68	-0.1000	223	-0.10	7.92	1	0	1.6
2337	-0.1000	0.0217	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.8	-0.1000	37.52	-0.1000	416	-0.10	7.64	0	0	3.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

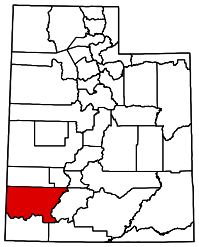
Map 14. Fremont River District



Sample Site
Irrigated Land
Water Body
SCD Boundary
Major Road
Other Road
Water Course
Ditch or Canal

Map Scale 1:69,142 (1 inch= 1.1 miles)

District Location



Juab County District

Water in the Juab County District varies from soft to very hard, with grains per gallon (gpg) ranging from 2.5 to 29.9 with a mean of 10.5. Sampled water temperature ranges from 14.1 °C to 32.1 °C, with a mean of 17.1 °C. The pH for the area has a mean of 7.54 and ranges from 6.35 to 8.58. Sample 2240 has high pH and may cause alkalinity problems such as mineral buildup. For sample 2110, pH is acidic and may be corrosive to plumbing.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. All samples have EC values greater than 750 µmhos/cm except 2116 and 2138. Samples 2110 and 2119 exceed the 3,000 µmhos/cm severe standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2107, 2110, 2112, 2114, and 2119 have elevated SAR values. Samples 2107, 2110, and 2119 exceed 9 and could cause severe problems.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, common for water in Utah, except for sample 2110. None of the samples exceed the 8.5 level.

Some specific elements can be toxic to plants. Samples 2110 and 2119 have elevated boron (B), which is toxic to sensitive plants when it exceeds concentrations of 0.7 ppm. B causes severe injury at 10.0 ppm. However, B in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating health from toxicity is small.

Chlorine, found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2107, 2111, 2112, 2114, 2115, 2117, 2118, and 2236 through 2240 have elevated chlorine. Samples 2112, 2114, and 2238 have chloride levels above 355 ppm, which can cause problems under all irrigation methods.

Iron (Fe) is a micro-nutrient and is required for plant growth. However, when it exceeds concentrations above 5 ppm it can injure plants. Samples 2110 and 2119 have excess iron.

Manganese (Mn) is a micro-nutrient and is required for plant growth, yet in excess it can damage plants. Samples 2110, 2114, 2119, and 2240 have elevated concentrations of manganese. Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca).

Livestock:

Sample 2137 has elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

Samples 2110, 2112, and 2119 have elevated sulfur (S) at concentrations which exceed the livestock standard for sulfur. Sulfur in the form of sulfate can cause water to be off flavored and also diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. The EPA aesthetic standard for TDS is 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. All samples **except** for 2113, 2116, and 2138 exceed the aesthetic standard for salinity. Samples 2110 and 2119 also exceed the health standard of 2,000 ppm.

Sample 2107 exceeds the EPA standard for Arsenic (As) and should not be used for drinking water.

Samples 2110 and 2119 have high iron (Fe). This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Samples 2110, 2114, 2119, 2236, and 2240 have a high manganese (Mn) concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations of manganese may cause discoloration of plumbing fixtures and have poor flavor.

Samples 2110, 2112, 2114, 2119, and 2137 also have high sulfur (S). Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2107, 2110, 2113 through 2115, 2117, 2137, 2236, 2239, and 2240 are contaminated with coliform.

Sample Site Test Data for Juab County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2107	-0.1000	28.96	2.63	0.0685	14.35	259.28	-0.10	7.95	22.9	879
2110	-0.1000	451.00	58.42	1.0221	60.02	862.54	-0.10	6.35	17.9	4392
2111	-0.1000	78.58	3.36	-0.1000	68.28	110.52	-0.10	7.12	14.1	832
2112	-0.1000	176.36	5.15	0.0615	109.08	236.28	-0.10	7.08	14.1	1542
2113	-0.1000	66.98	3.99	-0.1000	31.95	45.32	-0.10	7.49	14.5	465
2114	-0.1000	100.68	3.70	-0.1000	88.00	316.52	-0.10	7.08	16.5	1452
2115	-0.1000	108.87	3.74	-0.1000	36.00	127.59	-0.10	7.05	17.5	736
2116	-0.1000	66.24	1.31	-0.1000	29.20	14.99	-0.10	7.40	14.4	322
2117	-0.1000	107.57	3.56	-0.1000	30.73	121.01	-0.10	7.14	15.7	730
2118	-0.1000	118.34	3.78	-0.1000	35.64	128.43	-0.10	7.00	15.3	761
2119	-0.1000	351.47	43.74	1.4361	115.56	934.05	-0.10	6.68	32.1	3696
2137	-0.1000	85.64	4.42	0.0518	95.74	52.27	-0.10	7.88	14.9	742
2138	-0.1000	46.63	2.49	-0.1000	24.60	34.10	-0.10	7.96	15.4	338
2236	-0.1000	91.47	6.85	0.1003	34.72	105.81	-0.10	8.36	16.1	815
2237	-0.1000	92.06	4.03	0.0572	30.87	78.98	-0.10	8.13	16.4	653
2238	-0.1000	130.23	5.52	0.0979	50.23	134.53	-0.10	8.19	16.3	1011
2239	-0.1000	124.10	5.44	0.0838	44.42	103.75	-0.10	8.20	17.1	900
2240	-0.1000	84.54	5.06	0.0844	34.89	111.53	-0.10	8.58	16.6	782

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Juab County District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2107	-0.1000	0.45	297.42	-0.10	-0.1000	0.0481	1.67	-0.1000	-0.1000	-0.10	9.8	1,465
2110	-0.1000	0.98	-0.10	-0.10	-0.1000	619.3677	-0.10	9.9847	-0.1000	-0.10	10.1	7320
2111	-0.1000	0.17	185.72	-0.10	-0.1000	0.0568	5.63	-0.1000	-0.1000	0.86	2.2	1386
2112	0.0550	0.23	461.47	-0.10	-0.1000	0.2046	4.85	-0.1000	-0.1000	0.30	3.4	2570
2113	-0.1000	-0.10	112.54	-0.10	-0.1000	-0.1000	3.36	-0.1000	-0.1000	0.10	1.1	775
2114	-0.1000	0.11	447.69	-0.10	-0.1000	0.1497	5.35	0.3778	-0.1000	-0.10	5.6	2420
2115	-0.1000	-0.10	182.39	-0.10	-0.1000	0.0258	6.09	-0.1000	-0.1000	0.06	2.7	1227
2116	-0.1000	-0.10	19.43	-0.10	0.0341	0.0750	4.19	-0.1000	-0.1000	0.06	0.4	536
2117	-0.1000	-0.10	175.74	-0.10	-0.1000	0.0575	6.25	-0.1000	-0.1000	0.23	2.6	1216
2118	-0.1000	-0.10	193.83	-0.10	-0.1000	0.0690	6.73	-0.1000	-0.1000	0.17	2.7	1269
2119	-0.1000	1.09	-0.10	-0.10	-0.1000	7.4773	2.77	0.4226	-0.1000	0.85	11.0	6160
2137	0.1933	0.09	79.81	-0.10	-0.1000	0.1789	4.46	-0.1000	-0.1000	-0.10	0.9	1236
2138	0.1656	-0.10	51.50	-0.10	-0.1000	0.2319	3.41	0.0433	-0.1000	0.49	1.0	564
2236	-0.1000	0.13	294.90	-0.10	-0.1000	0.1502	2.48	0.0521	-0.1000	0.12	2.4	1359
2237	-0.1000	0.09	229.45	-0.10	-0.1000	-0.1000	2.68	-0.1000	-0.1000	-0.10	1.8	1089
2238	-0.1000	0.13	419.10	-0.10	-0.1000	0.0241	2.87	-0.1000	-0.1000	-0.10	2.5	1685
2239	-0.1000	0.11	353.53	-0.10	0.0299	0.0398	2.91	-0.1000	-0.1000	-0.10	2.0	1500
2240	-0.1000	0.09	339.60	-0.10	0.0364	0.1230	1.92	0.3527	-0.1000	-0.10	2.6	1303

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Juab County District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS	V	Zn
2107	-0.1000	0.0608	0.45	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	66.15	-0.1000	879	-0.1000	-0.10
2110	-0.1000	-0.1000	0.98	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	359.47	-0.1000	4,392	-0.1000	-0.10
2111	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	59.96	-0.1000	832	-0.1000	0.86
2112	0.0550	-0.1000	0.23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	194.29	-0.1000	1,542	-0.1000	0.30
2113	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.35	-0.1000	465	-0.1000	0.10
2114	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	121.43	-0.1000	1,452	-0.1000	-0.10
2115	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	38.59	-0.1000	736	-0.1000	0.06
2116	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.10	-0.1000	322	-0.1000	0.06
2117	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	26.32	-0.1000	730	-0.1000	0.23
2118	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	31.05	-0.1000	761	-0.1000	0.17
2119	-0.1000	-0.1000	1.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	294.24	-0.1000	3,696	-0.1000	0.85
2137	0.1933	-0.1000	0.09	-0.1000	-0.1000	-0.1000	0.0143	-0.1000	-0.1000	121.42	-0.1000	742	-0.1000	-0.10
2138	0.1656	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.93	-0.1000	338	-0.1000	0.49
2236	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	30.23	-0.1000	815	-0.1000	0.12
2237	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.81	-0.1000	653	-0.1000	-0.10
2238	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	40.59	-0.1000	1,011	-0.1000	-0.10
2239	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	33.30	-0.1000	900	-0.1000	-0.10
2240	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	20.60	-0.1000	782	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

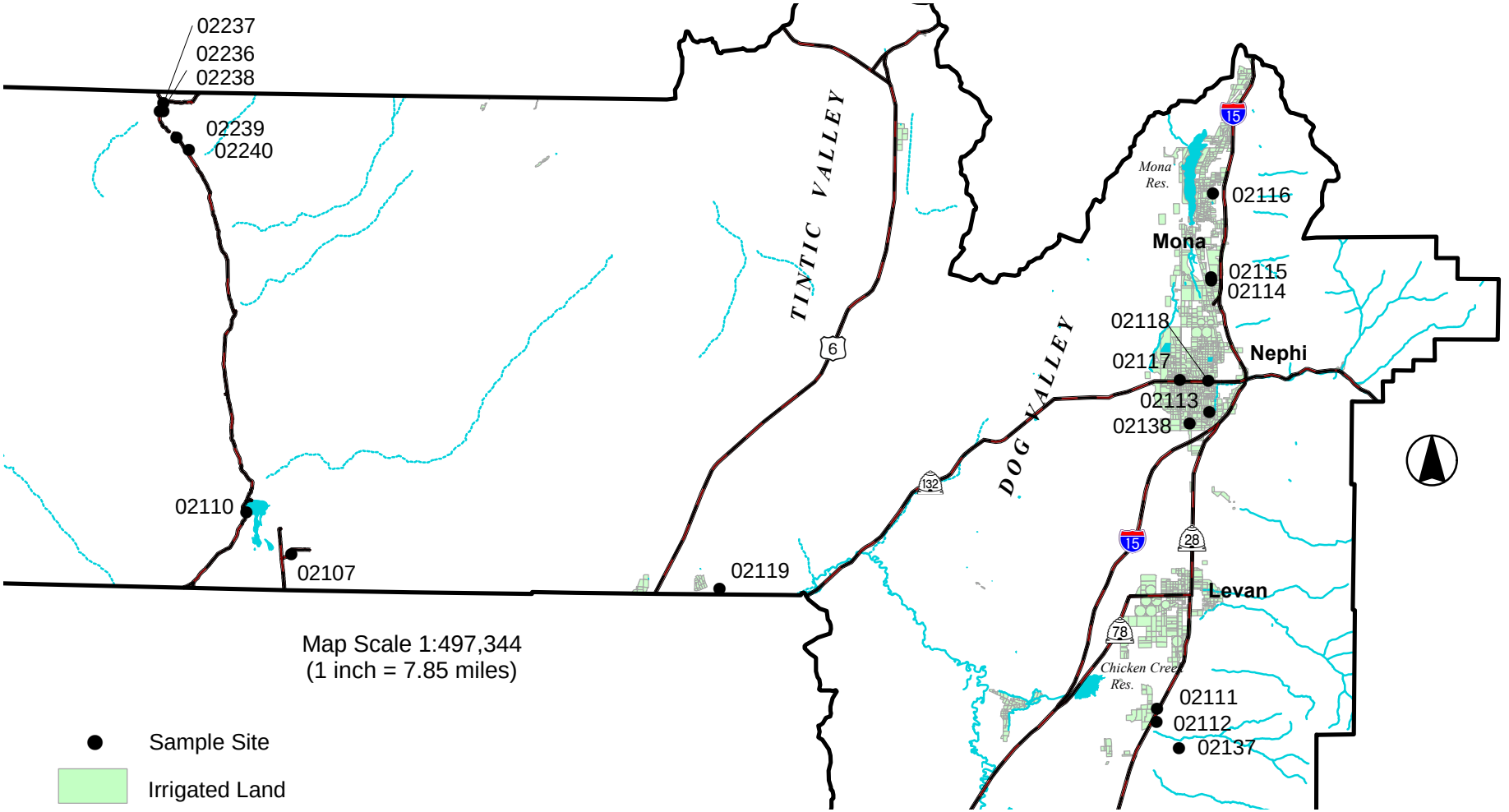
Sample Site Test Data for Juab County District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS	Zn	pH	Col	Ecoli	Hardness gpg
2107	0.0608	0.0330	-0.1000	-0.1000	-0.1000	0.0481	-0.1000	-0.1	-0.1000	66.15	-0.1000	879	-0.10	7.95	1	0	2.5
2110	-0.1000	0.0696	-0.1000	-0.1000	-0.1000	619.3677	9.9847	1.1	-0.1000	359.47	-0.1000	4,392	-0.10	6.35	1	0	29.9
2111	-0.1000	0.0441	-0.1000	-0.1000	-0.1000	0.0568	-0.1000	1.6	-0.1000	59.96	-0.1000	832	0.86	7.12	0	0	8.6
2112	-0.1000	0.0252	-0.1000	-0.1000	-0.1000	0.2046	-0.1000	0.7	-0.1000	194.29	-0.1000	1,542	0.30	7.08	0	0	16.7
2113	-0.1000	0.0856	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.6	-0.1000	14.35	-0.1000	465	0.10	7.49	1	0	5.8
2114	-0.1000	0.0258	-0.1000	-0.1000	-0.1000	0.1497	0.3778	4.0	-0.1000	121.43	-0.1000	1,452	-0.10	7.08	1	0	11.0
2115	-0.1000	0.0635	-0.1000	-0.1000	-0.1000	0.0258	-0.1000	4.0	-0.1000	38.59	-0.1000	736	0.06	7.05	1	0	8.5
2116	-0.1000	0.0722	-0.1000	-0.1000	0.0341	0.0750	-0.1000	0.6	-0.1000	19.10	-0.1000	322	0.06	7.40	0	0	5.6
2117	-0.1000	0.1218	-0.1000	-0.1000	-0.1000	0.0575	-0.1000	0.6	-0.1000	26.32	-0.1000	730	0.23	7.14	1	0	8.1
2118	-0.1000	0.1053	-0.1000	-0.1000	-0.1000	0.0690	-0.1000	2.2	-0.1000	31.05	-0.1000	761	0.17	7.00	0	0	9.0
2119	-0.1000	0.0368	-0.1000	-0.1000	-0.1000	7.4773	0.4226	-0.1	-0.1000	294.24	-0.1000	3,696	0.85	6.68	0	0	27.3
2137	-0.1000	0.0309	-0.1000	-0.1000	-0.1000	0.1789	-0.1000	-0.1	-0.1000	121.42	-0.1000	742	-0.10	7.88	1	0	10.6
2138	-0.1000	0.1346	-0.1000	-0.1000	-0.1000	0.2319	0.0433	1.1	-0.1000	10.93	-0.1000	338	0.49	7.96	0	0	4.2
2236	-0.1000	0.0521	-0.1000	-0.1000	-0.1000	0.1502	0.0521	-0.1	-0.1000	30.23	-0.1000	815	0.12	8.36	1	0	7.4
2237	-0.1000	0.0758	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.8	-0.1000	23.81	-0.1000	653	-0.10	8.13	0	0	7.2
2238	-0.1000	0.0746	-0.1000	-0.1000	-0.1000	0.0241	-0.1000	3.4	-0.1000	40.59	-0.1000	1,011	-0.10	8.19	0	0	10.6
2239	-0.1000	0.0979	-0.1000	-0.1000	0.0299	0.0398	-0.1000	3.1	-0.1000	33.30	-0.1000	900	-0.10	8.20	1	0	9.9
2240	-0.1000	0.1113	-0.1000	-0.1000	0.0364	0.1230	0.3527	0.2	-0.1000	20.60	-0.1000	782	-0.10	8.58	1	0	7.0

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 = absent.

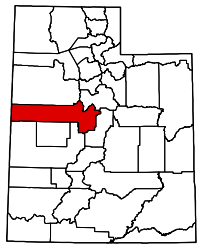
Map 15. Juab County District



Map Scale 1:497,344
(1 inch = 7.85 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Millard District

Water in the Millard District varies from moderate-hard to very hard, with grains per gallon (gpg) ranging from 3.8 to 39.9 with a mean of 111.18. Sampled water temperature ranges from 14.1 °C to 26.1 °C, with a mean of 17.3 °C. The pH for the area has a mean of 7.98 and ranges from 7.3 to 9.7. Sample 2227 has high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured.

Only four of the 23 samples have EC values **less** than 750 µmhos/cm —2102, 2217, 2218, 2221, and 2226. Samples 2227, 2228, and 2230 through 2232 exceed the severe-injury level of 3,000 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2227, 2228, 2230 through 2232, and 2280 have elevated SAR values. Samples 2227 and 2228 exceed 9 and can indicate severe problems.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah, **except** sample 2228. Sample 2227 exceeds the 8.5 level.

Samples 2227, 2228, 2230, 2231, and 2232 have elevated boron (B), which is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small.

Chlorine found in the form of chloride (Cl^-) can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2215, 2219, 2220, 2222 through 2224, and 2280 have elevated chlorine. Sample 2280 exceeds the 355 ppm level, indicating the likelihood of damage with any irrigation method.

Sample 2280 has elevated concentrations of manganese (Mn). Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca).

No other elements were found in concentrations harmful to plants.

Livestock:

Samples 2222 and 2230 through 2232 have sulfur (S) exceeding the livestock standard for sulfur. Sulfur in the form of sulfate can cause water to be off flavored and may cause diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for 15 samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Samples 2101, 2214 through 2216, 2219, 2222 through 2225, 2227, 2228, 2230 through 2232, and 2280 all exceed the aesthetic standard for TDS. Samples 2227, 2228, 2230, 2231, and 2232 exceed the health standard and should not be used for drinking.

Three minerals, iron (Fe), manganese (Mn), and sulfur (S) were found to exceed the aesthetic drinking water quality standard in some samples. Sample 2227 has high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria that stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Samples 2227, 2228, and 2280 have high manganese (Mn) concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Samples 2222, 2228, 2230 through 2232, and 2280 also have high sulfur. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

Sample 2232 exceeds the EPA nitrate (NO_3) standard of 10 ppm nitrate expressed as nitrogen (NO_3-N). NO_3 is an important nutrient for plant growth. It is found in nitrogen fertilizers, manure, septic systems, and some minerals. NO_3 is toxic to young infants (usually less than 6 months of age) and causes “blue baby syndrome.” NO_3 can only be removed from water by reverse osmosis or distillation.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2102, 2214, 2215, 2218 through 2221, 2223, 2224, and 2226, through 2228 are contaminated with coliform. Sample 2227 is contaminated with E. coli. Wells these samples were taken from should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Millard District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2101	-0.1000	80.72	5.43	0.1011	35.50	59.90	-0.10	7.50	18.7	534
2102	-0.1000	55.45	1.17	-0.1000	25.58	23.09	-0.10	7.54	14.2	311
2213	-0.1000	59.61	1.93	-0.1000	32.68	83.68	-0.10	7.85	19.4	486
2214	-0.1000	111.61	3.28	-0.1000	41.58	57.03	-0.10	7.41	16.2	638
2215	-0.1000	130.85	2.60	-0.1000	73.54	67.94	-0.10	7.50	14.1	915
2216	-0.1000	88.88	1.34	-0.1000	45.69	36.09	-0.10	7.74	14.5	541
2217	-0.1000	35.02	1.93	-0.1000	29.45	36.79	-0.10	8.17	18.7	340
2218	-0.1000	69.29	1.51	-0.1000	34.15	36.38	-0.10	8.02	17.6	444
2219	-0.1000	103.77	1.94	-0.1000	57.31	50.34	-0.10	7.30	17.6	685
2220	-0.1000	64.89	2.17	-0.1000	41.81	41.07	-0.10	8.20	18.5	495
2221	-0.1000	48.46	1.30	-0.1000	30.25	21.86	-0.10	8.12	19.3	323
2222	-0.1000	151.25	4.54	0.0903	113.87	70.30	-0.10	7.86	18.8	1041
2223	-0.1000	78.94	11.54	0.2324	60.26	85.76	-0.10	8.20	18.8	741
2224	-0.1000	90.92	13.55	0.2639	31.04	106.64	-0.10	8.30	15.9	715
2225	-0.1000	105.47	2.95	-0.1000	32.52	70.21	-0.10	8.21	15.1	597
2226	-0.1000	85.39	1.74	-0.1000	30.85	27.57	-0.10	8.07	14.9	450
2227	-0.1000	43.36	76.35	1.6747	88.04	779.51	-0.10	8.85	16.8	2994
2228	-0.1000	64.11	98.73	2.2625	61.26	846.72	-0.10	9.70	26.1	2778
2229	-0.1000	71.69	6.47	0.0974	33.87	48.61	-0.10	8.28	16.4	496
2230	-0.1000	345.48	36.87	0.6878	202.32	441.27	-0.10	7.79	19.0	2808
2231	-0.1000	364.23	57.76	1.4600	142.56	666.66	-0.10	7.55	18.0	3058
2232	-0.1000	379.85	11.48	0.7169	302.50	501.06	-0.10	7.68	14.7	3300
2280	-0.1000	128.17	7.71	0.0958	94.82	369.21	-0.10	7.59	14.6	1662

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Millard District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2101	-0.1000	0.23	82.60	-0.10	-0.1000	-0.1000	4.48	-0.1000	-0.1000	-0.10	1.4	890
2102	-0.1000	-0.10	30.76	-0.10	-0.1000	-0.1000	4.25	-0.1000	-0.1000	-0.10	0.6	518
2213	-0.1000	0.19	33.49	-0.10	0.0250	-0.1000	6.42	-0.1000	-0.1000	-0.10	2.2	810
2214	-0.1000	0.11	139.63	-0.10	-0.1000	-0.1000	4.99	-0.1000	-0.1000	-0.10	1.2	1,064
2215	-0.1000	0.09	316.73	-0.10	-0.1000	-0.1000	3.98	-0.1000	-0.1000	0.04	1.2	1,525
2216	-0.1000	-0.10	144.42	-0.10	0.0478	-0.1000	4.35	-0.1000	-0.1000	-0.10	0.8	901
2217	-0.1000	0.07	77.06	-0.10	-0.1000	-0.1000	3.03	-0.1000	-0.1000	-0.10	1.1	567
2218	-0.1000	0.07	94.42	-0.10	0.0226	-0.1000	4.15	-0.1000	-0.1000	0.05	0.9	740
2219	-0.1000	0.08	191.52	-0.10	0.0301	-0.1000	4.75	-0.1000	-0.1000	0.19	1.0	1,141
2220	-0.1000	0.10	171.82	-0.10	0.0265	-0.1000	3.12	-0.1000	-0.1000	-0.10	1.0	825
2221	-0.1000	-0.10	39.38	-0.10	0.0246	0.0428	4.21	-0.1000	-0.1000	-0.10	0.6	538
2222	-0.1000	0.17	225.20	-0.10	-0.1000	-0.1000	3.32	-0.1000	-0.1000	-0.10	1.1	1,735
2223	-0.1000	0.22	182.13	-0.10	-0.1000	-0.1000	3.61	-0.1000	-0.1000	-0.10	1.8	1,235
2224	-0.1000	0.49	230.92	-0.10	-0.1000	-0.1000	3.76	-0.1000	-0.1000	0.06	2.5	1,192
2225	-0.1000	0.22	123.06	-0.10	-0.1000	-0.1000	5.02	-0.1000	-0.1000	-0.10	1.5	995
2226	-0.1000	0.08	57.46	-0.10	-0.1000	-0.1000	5.45	-0.1000	-0.1000	-0.10	0.7	750
2227	-0.1000	2.31	-0.10	-0.10	-0.1000	0.3861	9.23	0.1974	-0.1000	-0.10	15.6	4,990
2228	-0.1000	2.63	-0.10	-0.10	-0.1000	0.1101	0.47	0.1405	-0.1000	-0.10	18.1	4,630
2229	-0.1000	0.23	130.96	-0.10	-0.1000	-0.1000	3.96	-0.1000	-0.1000	-0.10	1.2	826
2230	-0.1000	1.22	-0.10	-0.10	-0.1000	-0.1000	4.00	-0.1000	-0.1000	-0.10	4.7	4,680
2231	-0.1000	2.77	-0.10	-0.10	-0.1000	-0.1000	5.78	-0.1000	-0.1000	-0.10	7.5	5,096
2232	-0.1000	1.30	-0.10	-0.10	0.0214	-0.1000	3.22	-0.1000	-0.1000	-0.10	4.7	5,500
2280	-0.1000	0.57	520.41	-0.10	-0.1000	0.0938	7.66	0.5817	-0.1000	0.05	6.0	2,770

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Millard District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2101	-0.1000	-0.1000	0.23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	34.42	-0.1000	534	-0.1000	-0.10
2102	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.64	-0.1000	311	-0.1000	-0.10
2213	-0.1000	-0.1000	0.19	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.04	-0.1000	486	-0.1000	-0.10
2214	-0.1000	-0.1000	0.11	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	30.53	-0.1000	638	-0.1000	-0.10
2215	-0.1000	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	47.63	-0.1000	915	-0.1000	0.04
2216	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.32	-0.1000	541	-0.1000	-0.10
2217	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.87	-0.1000	340	0.0109	-0.10
2218	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.25	-0.1000	444	-0.1000	0.05
2219	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	30.31	-0.1000	685	-0.1000	0.19
2220	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.76	-0.1000	495	-0.1000	-0.10
2221	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.78	-0.1000	323	-0.1000	-0.10
2222	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	175.92	-0.1000	1,041	-0.1000	-0.10
2223	-0.1000	-0.1000	0.22	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	75.55	-0.1000	741	-0.1000	-0.10
2224	-0.1000	-0.1000	0.49	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	33.30	-0.1000	715	-0.1000	0.06
2225	-0.1000	-0.1000	0.22	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	41.55	-0.1000	597	-0.1000	-0.10
2226	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.27	-0.1000	450	-0.1000	-0.10
2227	-0.1000	-0.1000	2.31	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.55	-0.1000	2,994	-0.1000	-0.10
2228	-0.1000	-0.1000	2.63	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	105.48	-0.1000	2,778	-0.1000	-0.10
2229	-0.1000	-0.1000	0.23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	19.81	-0.1000	496	-0.1000	-0.10
2230	-0.1000	-0.1000	1.22	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	258.36	-0.1000	2,808	-0.1000	-0.10
2231	-0.1000	-0.1000	2.77	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	318.49	-0.1000	3,058	-0.1000	-0.10
2232	-0.1000	-0.1000	1.30	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	304.80	-0.1000	3,300	-0.1000	-0.10
2280	-0.1000	-0.1000	0.57	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	150.41	-0.1000	1,662	-0.1000	0.05

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

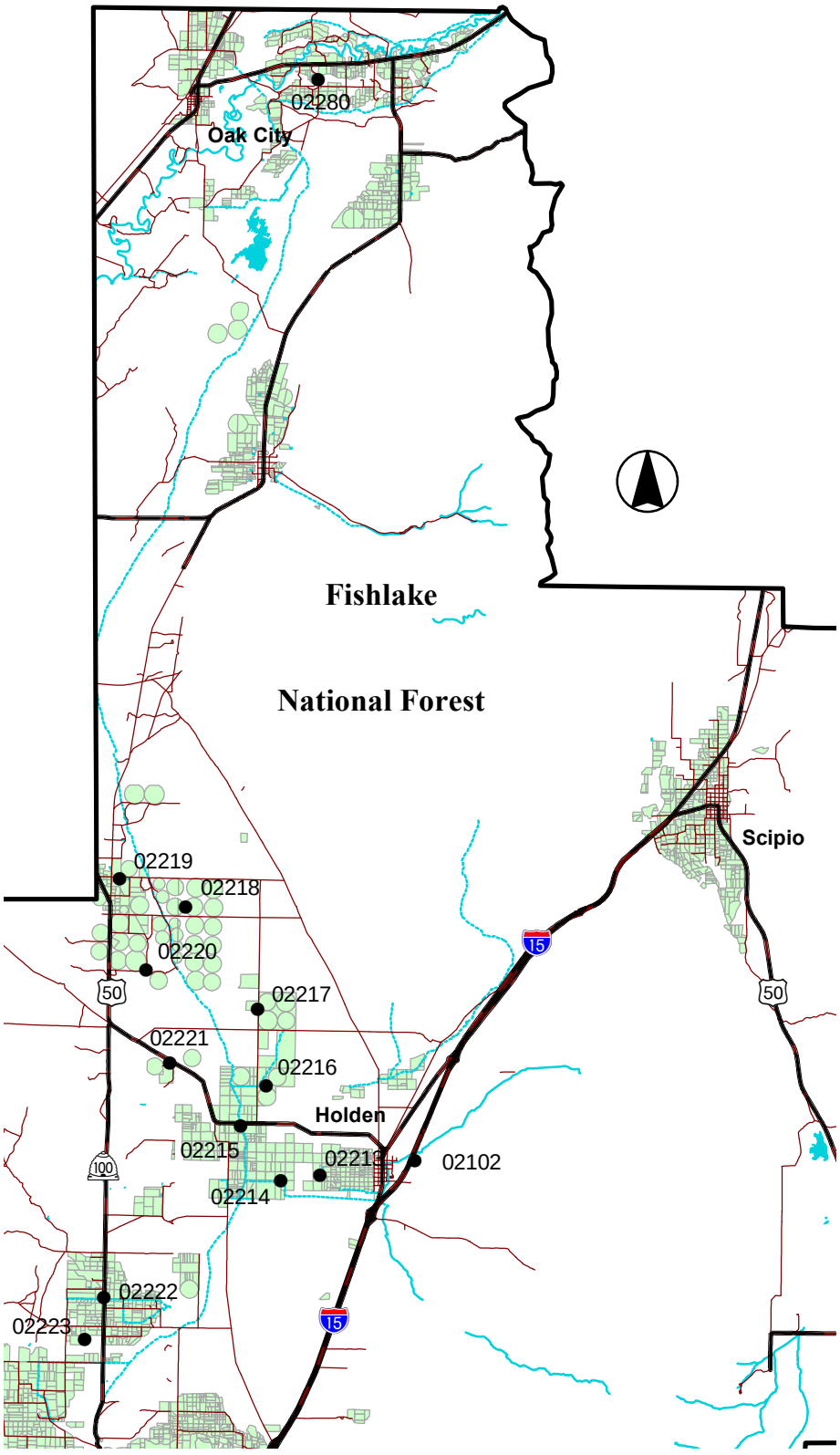
Sample Site Test Data for Millard District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2101	-0.1000	0.0658	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.60	-0.1000	34.42	-0.1000	534	-0.10	7.50	0	0	6.8
2102	-0.1000	0.0753	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.10	-0.1000	5.64	-0.1000	311	-0.10	7.54	1	0	4.7
2213	-0.1000	0.0799	-0.1000	-0.1000	0.0250	-0.1000	-0.1000	4.20	-0.1000	15.04	-0.1000	486	-0.10	7.85	0	0	5.4
2214	-0.1000	0.0413	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.70	-0.1000	30.53	-0.1000	638	-0.10	7.41	1	0	9.0
2215	-0.1000	0.0759	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.70	-0.1000	47.63	-0.1000	915	0.04	7.50	1	0	12.0
2216	-0.1000	0.1602	-0.1000	-0.1000	0.0478	-0.1000	-0.1000	7.70	-0.1000	11.32	-0.1000	541	-0.10	7.74	0	0	7.9
2217	-0.1000	0.2385	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.50	-0.1000	6.87	-0.1000	340	-0.10	8.17	0	0	3.8
2218	-0.1000	0.1933	-0.1000	-0.1000	0.0226	-0.1000	-0.1000	2.20	-0.1000	12.25	-0.1000	444	0.05	8.02	1	0	6.0
2219	-0.1000	0.0667	-0.1000	-0.1000	0.0301	-0.1000	-0.1000	3.70	-0.1000	30.31	-0.1000	685	0.19	7.30	1	0	9.4
2220	-0.1000	0.3013	-0.1000	-0.1000	0.0265	-0.1000	-0.1000	2.50	-0.1000	6.76	-0.1000	495	-0.10	8.20	1	0	6.2
2221	-0.1000	0.1369	-0.1000	-0.1000	0.0246	0.0428	-0.1000	2.10	-0.1000	4.78	-0.1000	323	-0.10	8.12	1	0	4.6
2222	-0.1000	0.0298	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.70	-0.1000	175.92	-0.1000	1,041	-0.10	7.86	0	0	15.5
2223	-0.1000	0.0413	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.80	-0.1000	75.55	-0.1000	741	-0.10	8.20	1	0	8.1
2224	-0.1000	0.0756	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.10	-0.1000	33.30	-0.1000	715	0.06	8.30	1	0	7.1
2225	-0.1000	0.0934	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.80	-0.1000	41.55	-0.1000	597	-0.10	8.21	0	0	8.1
2226	-0.1000	0.2200	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.20	-0.1000	14.27	-0.1000	450	-0.10	8.07	1	0	6.8
2227	-0.1000	0.0799	-0.1000	-0.1000	-0.1000	0.3861	0.1974	0.20	-0.1000	1.55	-0.1000	2,994	-0.10	8.85	1	1	7.7
2228	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1101	0.1405	0.10	-0.1000	105.48	-0.1000	2,778	-0.10	9.70	1	0	7.3
2229	-0.1000	0.1173	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.70	-0.1000	19.81	-0.1000	496	-0.10	8.28	0	0	6.2
2230	-0.1000	0.0681	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.80	-0.1000	258.36	-0.1000	2,808	-0.10	7.79	0	0	32.0
2231	-0.1000	0.0380	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.30	-0.1000	318.49	-0.1000	3,058	-0.10	7.55	0	0	29.6
2232	-0.1000	0.0512	-0.1000	-0.1000	0.0214	-0.1000	-0.1000	17.10	-0.1000	304.80	-0.1000	3,300	-0.10	7.68	0	0	39.9
2280	-0.1000	0.0417	-0.1000	-0.1000	-0.1000	0.0938	0.5817	1.20	-0.1000	150.41	-0.1000	1,662	0.05	7.59	0	0	13.0

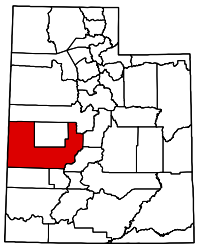
Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 16. Millard District, North Section



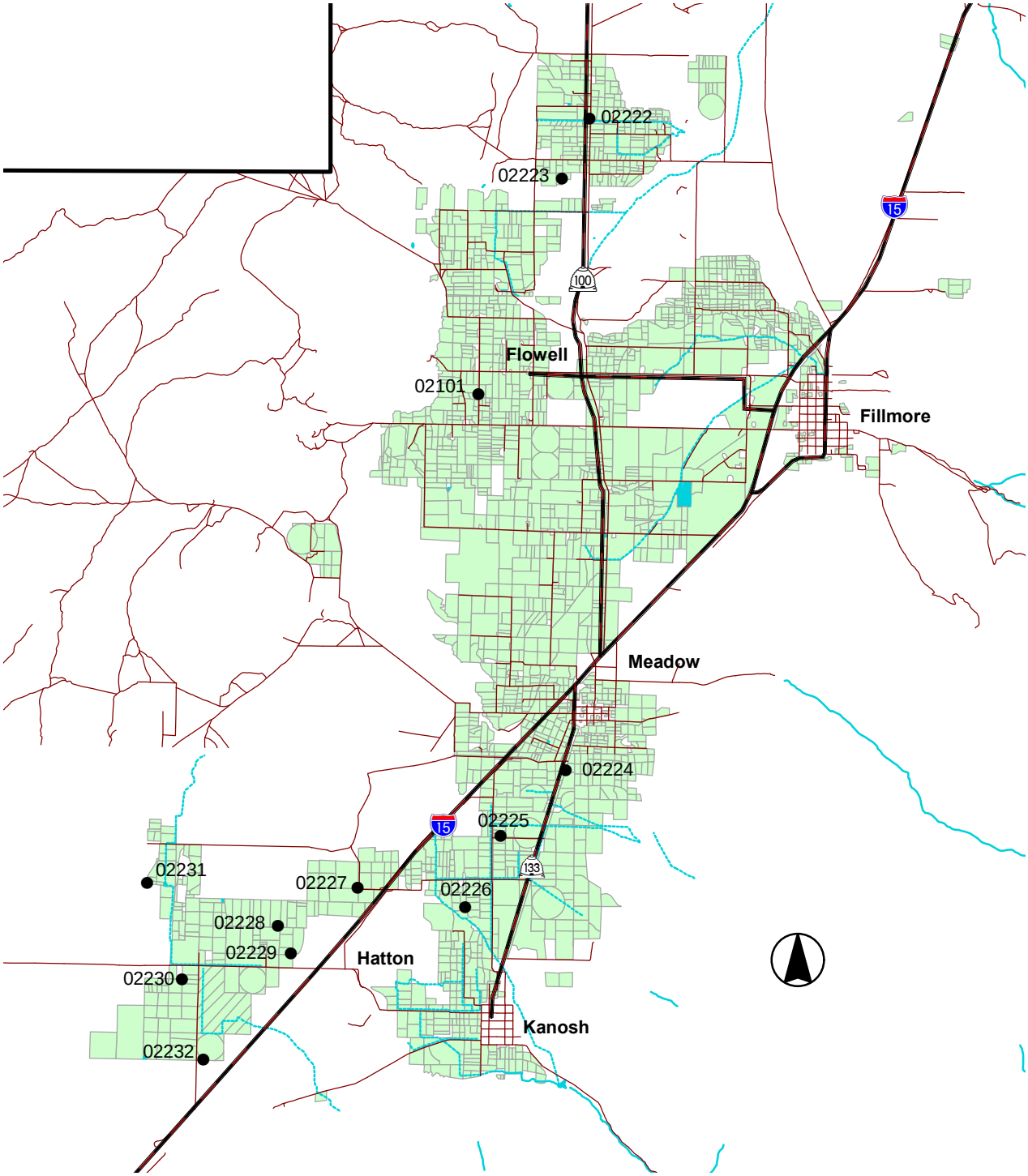
Sample Site
Irrigated Land
Water Body
SCD Boundary
Major Road
Other Road
Water Course
Ditch or Canal

District Location



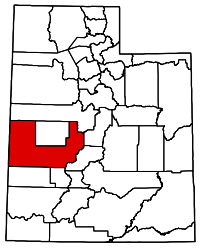
Map Scale 1:300,000 (1 inch = 4.75 miles)

Map 17. Millard District, South Section



Map Scale 1:182,428 (1 inch = 2.9 miles)

District Location



Sample Site

Irrigated Land

Water Body

SCD Boundary

Major Road

Other Road

Water Course

Ditch or Canal

Sanpete County District

Two samples were collected in the Sanpete County District. Water varies from soft to hard, with grains per gallon (gpg) ranging from 0.2 to 9.8 with a mean of 5.02. Sampled water temperature ranges from 14.3 °C to 14.9 °C, with a mean of 14.6 °C. The pH for the area has a mean of 8.29 and ranges from 7.22 to 9.36. Sample 2134 has high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2292 has an EC value greater than 750 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Sample 2134 has a SAR value of 22.8, making it a very high risk to use for irrigation.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 2292 exceeds the aesthetic standard for TDS.

Sample 2292 have high manganese (Mn) concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Sample 2134 exceeds the EPA primary standard for selenium (Se). This water should not be used for drinking without special treatment.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand,

indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Both samples 2134 and 2292 are contaminated with coliform (Col.).

Sample Site Test Data for Sanpete County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2134	-0.1000	2.69	3.11	0.1782	1.10	176.11	-0.10	9.36	14.9	450
2292	-0.1000	107.28	4.69	0.0980	60.67	100.11	-0.10	7.22	14.3	749

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2134	-0.1000	0.52	41.39	-0.10	-0.1000	0.0281	2.56	-0.1000	0.0120	-0.10	22.8	750
2292	-0.1000	0.17	86.38	-0.10	-0.1000	0.0348	2.56	0.1250	-0.1000	0.37	1.9	1,248

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2134	-0.1000	-0.1000	0.52	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.73	0.0120	450	-0.1000	-0.10
2292	-0.1000	-0.1000	0.17	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	64.97	-0.1000	749	-0.1000	0.37

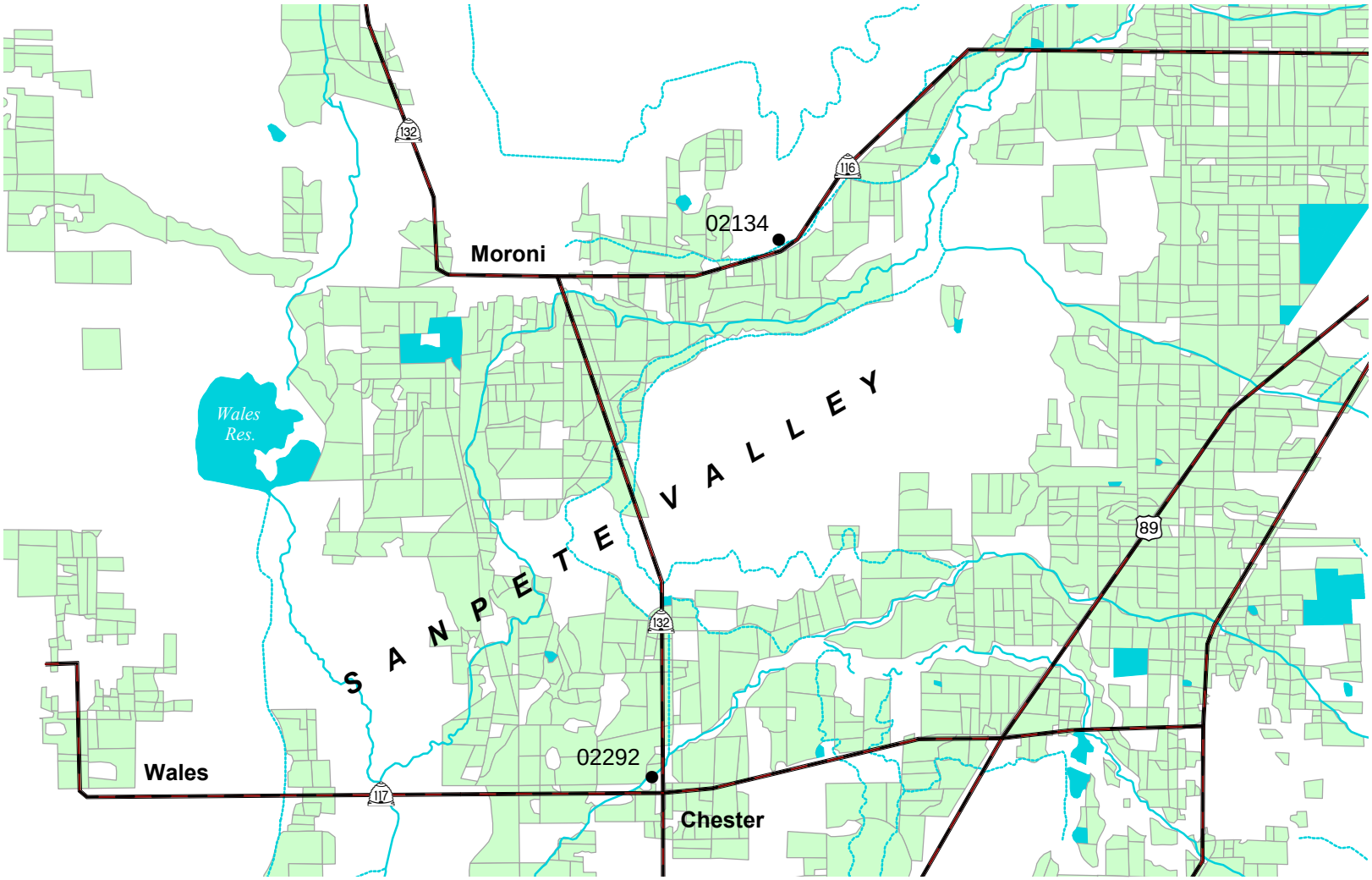
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2134	-0.1000	0.0760	-0.1000	-0.1000	-0.1000	0.0281	-0.1000	-0.1	-0.1000	1.73	0.0120	450	-0.10	9.36	1	0	0.2218
2292	-0.1000	0.0501	-0.1000	-0.1000	-0.1000	0.0348	0.1250	-0.1	-0.1000	64.97	-0.1000	749	0.37	7.22	1	0	9.8215

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

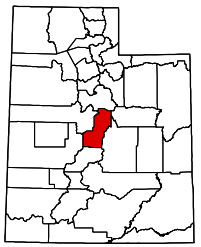
Map 18. Sanpete County District



Map Scale 1:66,892 (1 inch = 1.05 miles)

Sample Site
Irrigated Land
Water Body
SCD Boundary
Major Road
Other Road
Water Course
Ditch or Canal

District Location



Zone 5

UACD Zone 5 consists of seven districts in five counties, including Beaver, Iron, Garfield, Kane, and Washington counties.

Eighty-four sites were sampled in seven districts of Zone 5 during the spring, summer, and fall of 2002. Thirteen wells were sampled in the Beaver District, seven in Canyonlands District, five in the Dixie District, thirteen in the Enterprise & Iron (E & I) District, two in Cane County District, thirty-four in Twin M District, and twelve in the Upper Sevier District. A separate narrative report is presented for each district. These reports include data tables and maps showing locations of sample sites. Each report covers three categories of water quality criteria—irrigation, livestock and culinary. Since water use may overlap among these categories for a single well, analytical results are compared to all three sets of criteria.

Beaver District

Water in the Beaver District varies from soft to moderate with grains per gallon (gpg) ranging from 0.5 to 10.8 with a mean of 1.98. Sampled water temperature ranges from 5.3 °C to 17.6 °C, with a mean of 10.88 °C. The pH for the area has a mean of 8.02 and ranges from 6.7 to 8.75. Samples 2248, 2249, and 2258 have high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2158 has an EC value greater than 750 µmhos/cm.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Sample 2158 also has an elevated SAR value.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Samples 2158, 2252, 2253, 2255, 2256, and 2258 have high bicarbonate.

Sample 2158 has elevated boron (B), which is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small.

No other elements were found in concentrations harmful to plants.

Livestock:

Sample 2158 has elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 2158 exceeds the aesthetic standard for TDS.

Sample 2258 has high manganese concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Sample 2158 also has high sulfur. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2247 through 2251, 2253, and 2255 are contaminated with coliform and sample 2249 is also contaminated with E. coli. The well from which sample 2249 was collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Beaver District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2158	0.0309	123.69	13.15	0.0524	60.84	180.26	-0.10	7.38	13.6	1052
2247	-0.1000	7.93	0.88	-0.1000	2.95	6.61	-0.10	8.41	5.8	59
2248	-0.1000	8.94	0.31	-0.1000	2.21	7.86	-0.10	8.58	6.8	59
2249	-0.1000	8.09	0.73	-0.1000	2.91	7.05	-0.10	8.55	5.3	59
2250	-0.1000	9.62	0.92	-0.1000	2.70	6.98	-0.10	8.22	7.2	59
2251	-0.1000	8.20	0.99	-0.1000	2.57	6.34	-0.10	8.38	7.7	57
2252	-0.1000	17.93	1.03	-0.1000	5.85	8.78	-0.10	7.42	10.4	108
2253	-0.1000	6.57	-0.10	-0.1000	1.87	8.26	-0.10	6.70	7.7	51
2254	-0.1000	16.40	-0.10	-0.1000	5.05	9.50	-0.10	8.44	12.1	95
2255	-0.1000	24.62	1.71	-0.1000	5.91	9.31	-0.10	7.71	13.3	127
2256	0.0641	24.80	2.37	-0.1000	6.93	10.55	-0.10	7.85	17.5	143
2258	-0.1000	21.45	5.42	-0.1000	4.27	25.13	-0.10	8.75	16.4	162
2282	0.0690	48.17	1.59	-0.1000	10.47	14.21	-0.10	7.81	17.6	241

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2158	-0.1000	0.89	143.59	-0.10	0.0218	-0.1000	6.44	-0.1000	-0.1000	-0.10	3.3	1,753
2247	-0.1000	-0.10	4.29	-0.10	-0.1000	-0.1000	0.85	-0.1000	-0.1000	-0.10	0.5	99
2248	0.0444	-0.10	4.20	-0.10	-0.1000	-0.1000	0.80	-0.1000	-0.1000	-0.10	0.6	99
2249	-0.1000	-0.10	4.17	-0.10	-0.1000	-0.1000	0.81	-0.1000	-0.1000	-0.10	0.5	99
2250	-0.1000	-0.10	4.06	-0.10	-0.1000	0.0603	0.85	-0.1000	-0.1000	-0.10	0.5	98
2251	-0.1000	-0.10	4.06	-0.10	-0.1000	-0.1000	0.80	-0.1000	-0.1000	-0.10	0.5	95
2252	0.0827	-0.10	4.38	-0.10	-0.1000	0.1661	1.59	0.0412	-0.1000	-0.10	0.5	180
2253	0.4028	-0.10	4.31	-0.10	-0.1000	0.2909	6.01	-0.1000	-0.1000	-0.10	0.7	85
2254	0.0752	-0.10	4.49	-0.10	-0.1000	0.0580	1.34	-0.1000	-0.1000	-0.10	0.5	159
2255	-0.1000	-0.10	7.01	-0.10	-0.1000	0.0344	1.80	-0.1000	-0.1000	1.06	0.4	212
2256	-0.1000	-0.10	15.55	-0.10	-0.1000	0.0321	1.61	0.0240	-0.1000	0.40	0.5	239
2258	-0.1000	-0.10	10.68	-0.10	-0.1000	-0.1000	1.61	0.0785	-0.1000	-0.10	1.3	270
2282	-0.1000	-0.10	63.01	-0.10	-0.1000	0.0254	1.46	-0.1000	-0.1000	-0.10	0.5	401

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Beaver District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2158	-0.1000	-0.10	0.89	-0.1000	-0.1000	-0.1000	0.0101	-0.1000	-0.1000	142.14	-0.1000	1,052	-0.1	-0.1
2247	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.17	-0.1000	59	-0.1	-0.1
2248	0.0444	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.95	-0.1000	59	-0.1	-0.1
2249	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.23	-0.1000	59	-0.1	-0.1
2250	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.82	-0.1000	59	-0.1	-0.1
2251	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.87	-0.1000	57	-0.1	-0.1
2252	0.0827	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.82	-0.1000	108	-0.1	-0.1
2253	0.4028	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.11	-0.1000	51	-0.1	-0.1
2254	0.0752	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.26	-0.1000	95	-0.1	-0.1
2255	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.62	-0.1000	127	-0.1	1.065
2256	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.69	-0.1000	143	-0.1	0.4027
2258	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.49	-0.1000	162	-0.1	-0.1
2282	-0.1000	-0.10	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.23	-0.1000	241	-0.1	-0.1

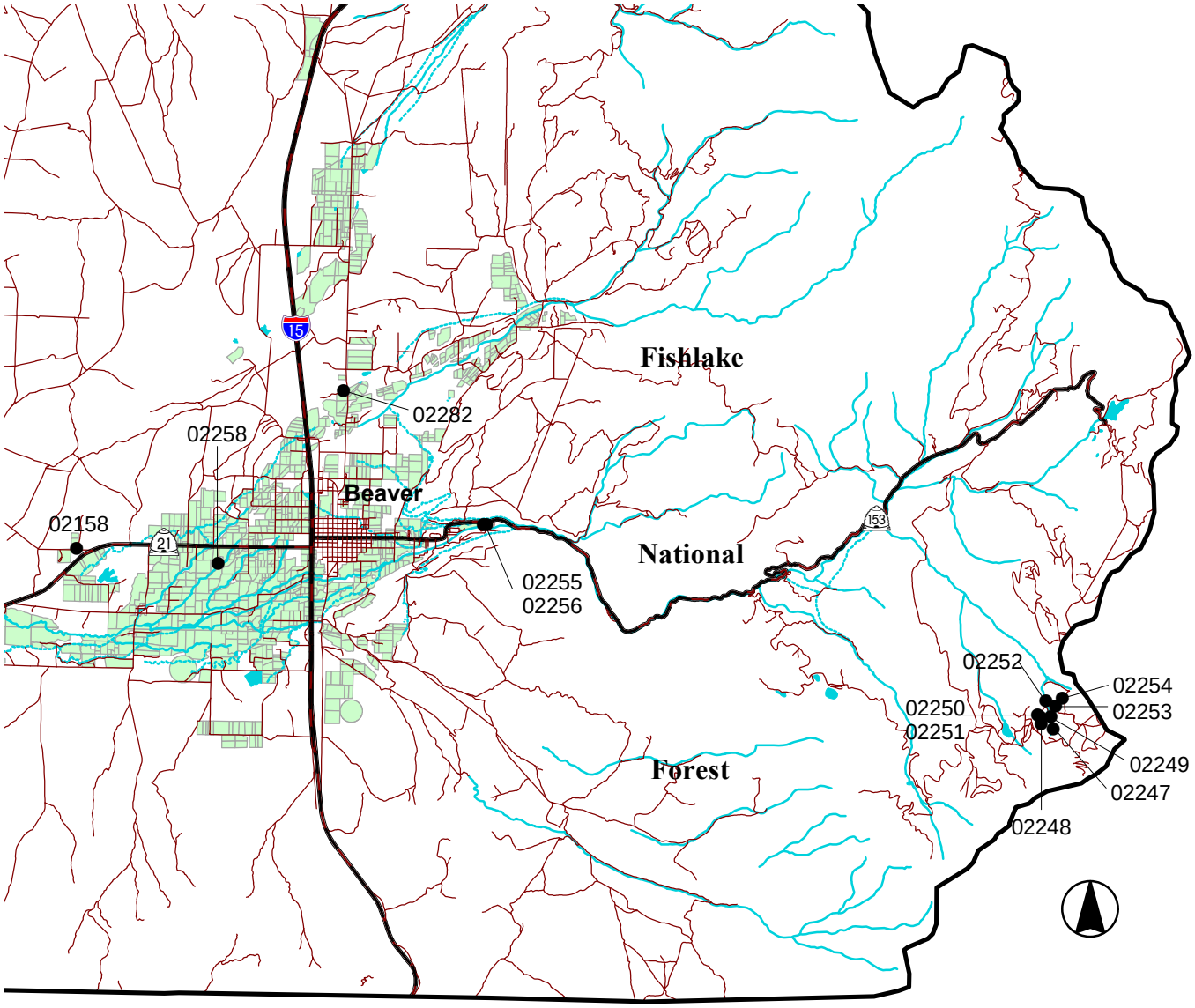
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2158	-0.1000	0.0309	-0.1000	-0.1000	0.0218	-0.1000	-0.1000	4.2	-0.1000	142.1429	-0.1000	1,052	-0.1	7.38	0	0	10.8
2247	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	1.1674	-0.1000	59	-0.1	8.41	1	0	0.6
2248	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	0.9537	-0.1000	59	-0.1	8.58	1	0	0.7
2249	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	1.2290	-0.1000	59	-0.1	8.55	1	1	0.6
2250	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0603	-0.1000	-0.1	-0.1000	0.8226	-0.1000	59	-0.1	8.22	1	0	0.7
2251	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	0.8719	-0.1000	57	-0.1	8.38	1	0	0.6
2252	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1661	0.0412	0.2	-0.1000	1.8160	-0.1000	108	-0.1	7.42	0	0	1.4
2253	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2909	-0.1000	-0.1	-0.1000	2.1067	-0.1000	51	-0.1	6.7	1	0	0.5
2254	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0580	-0.1000	-0.1	-0.1000	3.2610	-0.1000	95	-0.1	8.44	0	0	1.3
2255	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0344	-0.1000	0.2	-0.1000	2.6177	-0.1000	127	1.065	7.71	1	0	1.8
2256	-0.1000	0.0641	-0.1000	-0.1000	-0.1000	0.0321	0.0240	0.3	-0.1000	4.6932	-0.1000	143	0.4027	7.85	0	0	1.9
2258	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0785	-0.1	-0.1000	10.4906	-0.1000	162	-0.1	8.75	0	0	1.5
2282	-0.1000	0.0690	-0.1000	-0.1000	-0.1000	0.0254	-0.1000	1.2	-0.1000	9.2287	-0.1000	241	-0.1	7.81	0	0	3.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

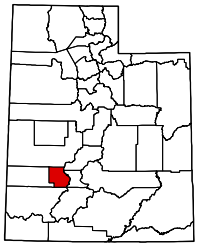
Map 19. Beaver District



Map Scale 1:209,365 (1 inch = 3.3 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Canyonlands District

Water in the Canyonlands District varies from soft to hard with grains per gallon (gpg) ranging from 0.7 to 8.5 with a mean of 3.36. Sampled water temperature ranges from 12.1 °C to 29.7 °C, with a mean of 17.16 °C. The pH for the area has a mean of 7.60 and ranges from 6.7 to 8.24.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2327 has an EC value greater than 750 µmhos/cm.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples **except** 2333 have high bicarbonate.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 2327 exceeds the aesthetic standard for TDS.

Sample 2327 also has high sulfur. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well

casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 2327 is contaminated with coliform bacteria.

Sample Site Test Data for Canyonlands District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2327	-0.1000	103.55	4.45	0.0615	41.28	105.75	-0.10	8.24	12.1	653
2330	-0.1000	44.30	2.55	-0.1000	15.55	11.20	-0.10	7.40	15.9	340
2331	-0.1000	32.10	2.57	-0.1000	16.36	9.34	-0.10	7.66	14.3	349
2332	-0.1000	32.14	0.80	-0.1000	3.90	5.82	-0.10	7.64	16.6	269
2333	-0.1000	8.51	2.84	-0.1000	2.93	2.13	-0.10	6.70	29.7	82
2334	-0.1000	18.08	6.64	-0.1000	18.38	9.55	-0.10	7.80	14.5	283
2335	-0.1000	44.17	0.85	-0.1000	20.52	4.73	-0.10	7.73	17.0	296

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2327	-0.1000	0.14	10.37	-0.10	-0.1000	0.0317	5.01	-0.1000	-0.1000	-0.10	2.2	1,089
2330	-0.1000	0.07	4.66	-0.10	-0.1000	-0.1000	3.49	-0.1000	-0.1000	0.13	0.4	567
2331	-0.1000	0.07	4.41	-0.10	-0.1000	-0.1000	3.32	-0.1000	-0.1000	-0.10	0.3	582
2332	-0.1000	-0.10	8.33	-0.10	-0.1000	-0.1000	1.63	-0.1000	-0.1000	-0.10	0.3	449
2333	-0.1000	-0.10	-0.10	-0.10	0.0612	0.0576	0.64	0.0414	-0.1000	1.86	0.2	136
2334	-0.1000	-0.10	8.62	-0.10	-0.1000	-0.1000	3.74	-0.1000	-0.1000	0.07	0.4	472
2335	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0201	2.72	-0.1000	-0.1000	-0.10	0.1	493

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Canyonlands District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2327	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	123.78	-0.1000	653	-0.1000	-0.10
2330	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.08	-0.1000	340	-0.1000	0.13
2331	-0.1000	-0.1000	0.07	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.58	-0.1000	349	-0.1000	-0.10
2332	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.10	-0.1000	269	-0.1000	-0.10
2333	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.85	-0.1000	82	-0.1000	1.86
2334	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.34	-0.1000	283	-0.1000	0.07
2335	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	37.07	-0.1000	296	-0.1000	-0.10

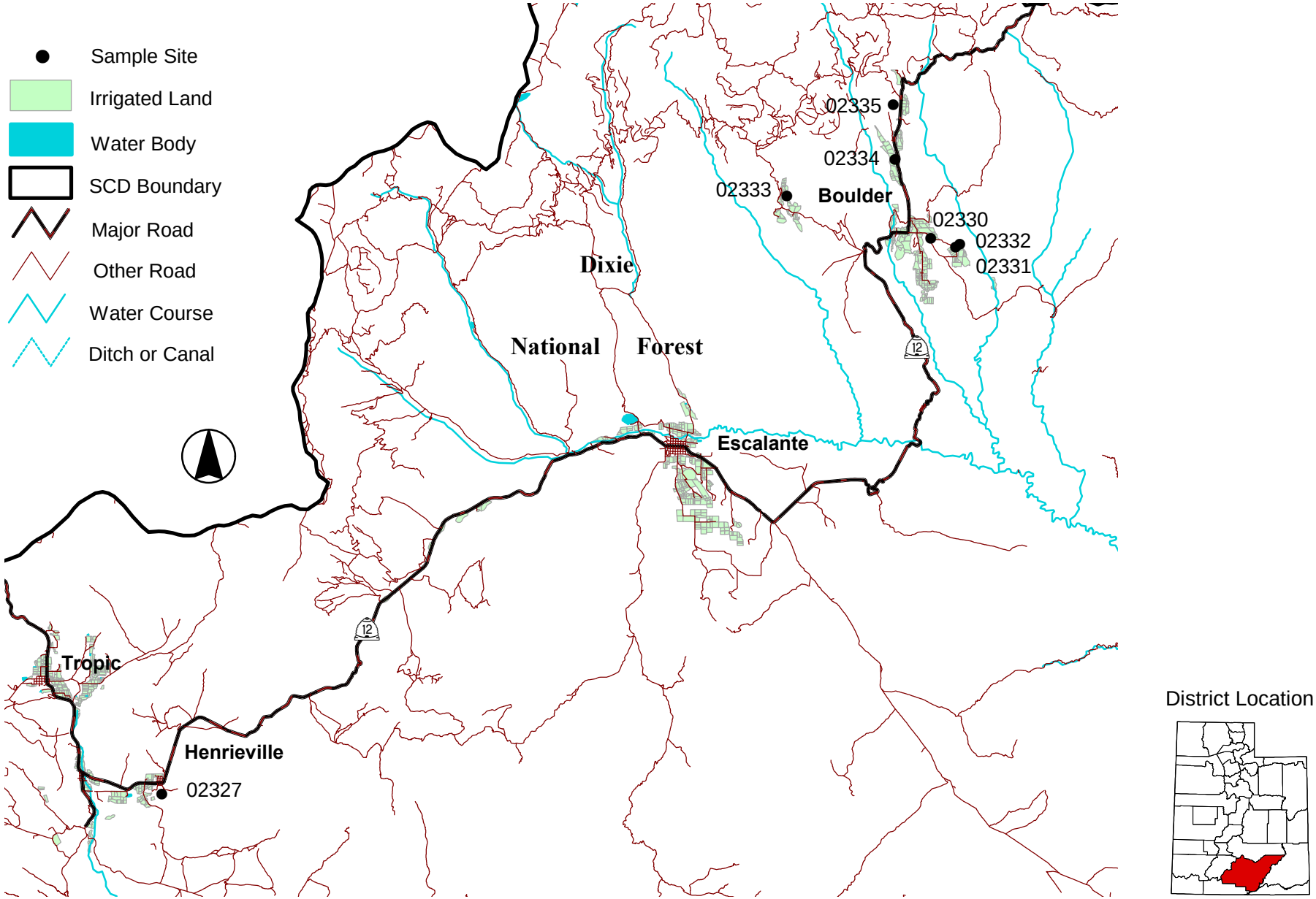
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2327	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0317	-0.1000	-0.1	-0.1000	123.78	-0.1000	653	-0.10	8.24	1	0	8.5
2330	-0.1000	0.0363	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	5.08	-0.1000	340	0.13	7.40	0	0	3.5
2331	-0.1000	0.0888	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.3	-0.1000	4.58	-0.1000	349	-0.10	7.66	0	0	2.8
2332	-0.1000	0.0546	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.5	-0.1000	5.10	-0.1000	269	-0.10	7.64	0	0	2.1
2333	-0.1000	0.0650	-0.1000	-0.1000	0.0612	0.0576	0.0414	-0.1	-0.1000	3.85	-0.1000	82	1.86	6.70	0	0	0.7
2334	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1	-0.1000	7.34	-0.1000	283	0.07	7.80	0	0	2.1
2335	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0201	-0.1000	0.1	-0.1000	37.07	-0.1000	296	-0.10	7.73	0	0	3.8

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 20. Canyonlands District



Map Scale 1:372,560 (1 inch = 5.9 miles)

Dixie District

Water in the Dixie District varies from soft to hard, with grains per gallon (gpg) ranging from 1.5 to 7.4, with a mean of 4.12. Sampled water temperature ranges from 4.4 °C to 17.2 °C, with a mean of 12.2 °C. The pH for the area has a mean of 7.45 and ranges from 6.88 to 8.10.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Sample 2039 in this district exceed the 750 µmhos/cm standard or exceed the severe injury level of 3,000 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate. High bicarbonate concentrations are common for water in Utah.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Two minerals, iron (Fe), and manganese (Mn), were found to exceed the aesthetic drinking water quality standard in some samples. Sample 2034 has high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Sample 2032 has high manganese concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well

casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables. Samples 2032 and 2034 are contaminated with coliform.

No samples were contaminated with E. coli.

Sample Site Test Data for Dixie District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2034	-0.1000	16.12	1.77	-0.1000	9.20	14.81	-0.10	7.11	7.8	60
2038	-0.1000	39.74	1.66	-0.1000	20.35	7.00	-0.10	8.10	4.4	180
2039	-0.1000	91.00	2.73	-0.1000	35.41	21.90	-0.10	7.71	17.2	480
2032	-0.1000	54.83	2.65	-0.1000	23.85	23.89	-0.10	6.88	14.4	300
2033	-0.1000	53.12	1.30	-0.1000	8.89	11.97	-0.10	7.45	17.2	180

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2034	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.8231	1.90	-0.1000	-0.1000	-0.10	0.7	100
2038	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0897	2.15	-0.1000	-0.1000	1.06	0.2	300
2039	-0.1000	0.08	13.94	-0.10	-0.1000	0.0691	3.36	-0.1000	-0.1000	0.84	0.5	800
2032	-0.1000	0.18	11.45	-0.10	-0.1000	0.2080	4.64	0.1461	-0.1000	-0.10	0.7	500
2033	0.0409	0.09	10.55	-0.10	-0.1000	-0.1000	2.89	-0.1000	-0.1000	0.93	0.4	300

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently.
Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Dixie District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2034	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	2.23	-0.1000	60	-0.1000	-0.10
2038	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	28.36	-0.1000	180	-0.1000	1.06
2039	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	77.10	-0.1000	480	-0.1000	0.84
2032	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	10.19	-0.1000	300	-0.1000	-0.10
2033	0.0409	-0.1000	0.09	-0.1000	-0.1000	-0.1000	-0.1000	-0.10	-0.1000	9.44	-0.1000	180	-0.1000	0.93

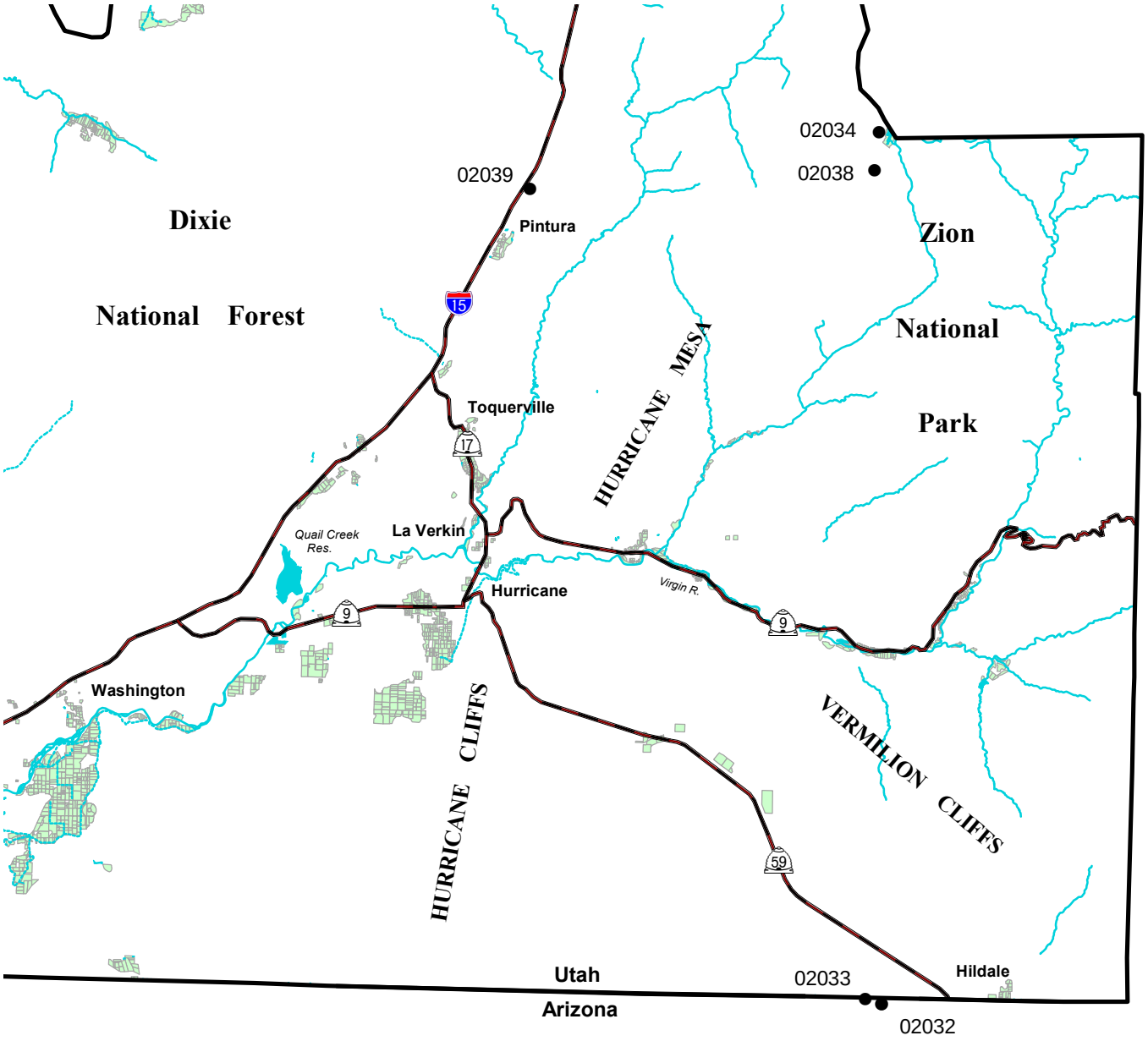
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2034	-0.1000	0.0767	-0.1000	-0.1000	-0.1000	0.8231	-0.1000	0.5	-0.1000	2.23	-0.1000	60	-0.10	7.11	1	0	1.5
2038	-0.1000	0.0520	-0.1000	-0.1000	-0.1000	0.0897	-0.1000	0.9	-0.1000	28.36	-0.1000	180	1.06	8.10	0	0	3.5
2039	-0.1000	0.0514	-0.1000	-0.1000	-0.1000	0.0691	-0.1000	0.7	-0.1000	77.10	-0.1000	480	0.84	7.71	0	0	7.4
2032	-0.1000	0.1030	-0.1000	-0.1000	-0.1000	0.2080	0.1461	0.1	-0.1000	10.19	-0.1000	300	-0.10	6.88	1	0	4.6
2033	-0.1000	0.1122	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.8	-0.1000	9.44	-0.1000	180	0.93	7.45	0	0	3.6

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

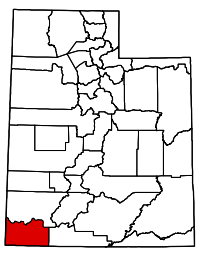
Map 21. Dixie District



Map Scale 326,943 (1 inch = 5.26 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Enterprise and Iron (E&I) District

Water in the Enterprise and Iron (E&I) District varies from soft to hard with grains per gallon (gpg) ranging from 2.5 to 7.6 with a mean of 4.60. Sampled water temperature ranges from 8.9 °C to 18.8 °C, with a mean of 15.45 °C. The pH for the area has a mean of 7.41 and ranges from 6.48 to 7.90. Sample 2026 pH is acidic and may be corrosive to plumbing.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. Sample 2287 exceeds the 750 standard. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. None of the samples exceed the severe injury level of 3,000 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. None of the water sampled in this district has elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah. No samples exceed the 8.5 level.

No other elements were found in concentrations harmful to plants.

Livestock:

No water quality standards for livestock were exceeded.

Culinary:

Samples 2028 and 2037 have high manganese concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables. Samples 2025, 2028, 2036, and 2287 were contaminated with coliform and sample 2028 with E. coli. The well from which sample 2028 was collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Enterprise and Iron District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2023	-0.1000	52.36	6.52	-0.1000	9.77	20.29	-0.10	7.55	18.8	240
2024	-0.1000	46.14	3.46	-0.1000	11.67	22.21	-0.10	7.90	15.5	240
2025	-0.1000	48.54	8.20	-0.1000	9.52	17.20	-0.10	7.35	18.8	180
2026	-0.1000	51.97	1.34	-0.1000	10.45	14.67	-0.10	6.48	17.2	180
2027	-0.1000	58.45	1.39	-0.1000	7.51	17.07	-0.10	7.85	15.5	180
2028	-0.1000	35.43	3.82	-0.1000	6.61	24.20	-0.10	7.85	15.5	120
2029	-0.1000	77.25	3.14	-0.1000	11.62	17.80	-0.10	7.38	15.5	240
2030	-0.1000	85.45	1.30	-0.1000	7.72	18.28	-0.10	7.53	15.0	240
2031	-0.1000	64.25	1.37	-0.1000	8.58	13.87	-0.10	6.81	16.1	180
2035	-0.1000	85.75	2.54	-0.1000	26.88	9.63	-0.10	6.85	8.9	240
2036	-0.1000	100.18	1.81	-0.1000	29.58	3.78	-0.10	7.30	14.4	300
2037	-0.1000	56.57	7.84	0.0611	18.53	71.58	-0.10	7.68	12.8	300
2287	-0.1000	58.70	7.07	-0.1000	43.52	41.48	-0.10	7.85	16.9	459

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2023	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0755	3.20	-0.1000	-0.1000	0.06	0.7	400
2024	-0.1000	-0.10	13.76	-0.10	-0.1000	0.0201	3.16	-0.1000	-0.1000	0.09	0.8	400
2025	-0.1000	-0.10	17.85	-0.10	-0.1000	0.0203	3.14	-0.1000	-0.1000	0.18	0.6	300
2026	-0.1000	-0.10	24.76	-0.10	-0.1000	0.0466	2.91	-0.1000	-0.1000	1.06	0.5	300
2027	-0.1000	-0.10	26.10	-0.10	-0.1000	-0.1000	2.93	-0.1000	-0.1000	0.12	0.6	300
2028	0.0886	-0.10	11.78	-0.10	-0.1000	0.1234	2.93	0.1109	-0.1000	-0.10	1.0	200
2029	-0.1000	-0.10	41.21	-0.10	-0.1000	-0.1000	3.51	-0.1000	-0.1000	-0.10	0.5	400
2030	-0.1000	-0.10	67.38	-0.10	-0.1000	0.1715	3.05	-0.1000	-0.1000	0.20	0.5	400
2031	-0.1000	-0.10	21.46	-0.10	-0.1000	0.0594	3.20	-0.1000	-0.1000	0.10	0.4	300
2035	-0.1000	-0.10	12.09	-0.10	-0.1000	-0.1000	5.53	-0.1000	-0.1000	0.05	0.2	400
2036	-0.1000	-0.10	-0.10	-0.10	0.0229	0.0226	5.76	-0.1000	-0.1000	0.10	0.1	500
2037	-0.1000	0.08	-0.10	-0.10	-0.1000	0.1003	5.68	0.1812	-0.1000	-0.10	2.1	500
2287	-0.1000	0.12	25.53	-0.10	-0.1000	-0.1000	4.00	-0.1000	-0.1000	-0.10	1.0	765

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Enterprise and Iron District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2023	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.70	-0.1000	240	-0.1000	0.06
2024	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.60	-0.1000	240	-0.1000	0.09
2025	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.43	-0.1000	180	-0.1000	0.18
2026	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.54	-0.1000	180	-0.1000	1.06
2027	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.93	-0.1000	180	-0.1000	0.12
2028	0.0886	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.34	-0.1000	120	-0.1000	-0.10
2029	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	9.18	-0.1000	240	-0.1000	-0.10
2030	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.83	-0.1000	240	-0.1000	0.20
2031	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.39	-0.1000	180	-0.1000	0.10
2035	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.64	-0.1000	240	-0.1000	0.05
2036	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	21.53	-0.1000	300	-0.1000	0.10
2037	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.20	-0.1000	300	-0.1000	-0.10
2287	-0.1000	-0.1000	0.12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	58.98	-0.1000	459	-0.1000	-0.10

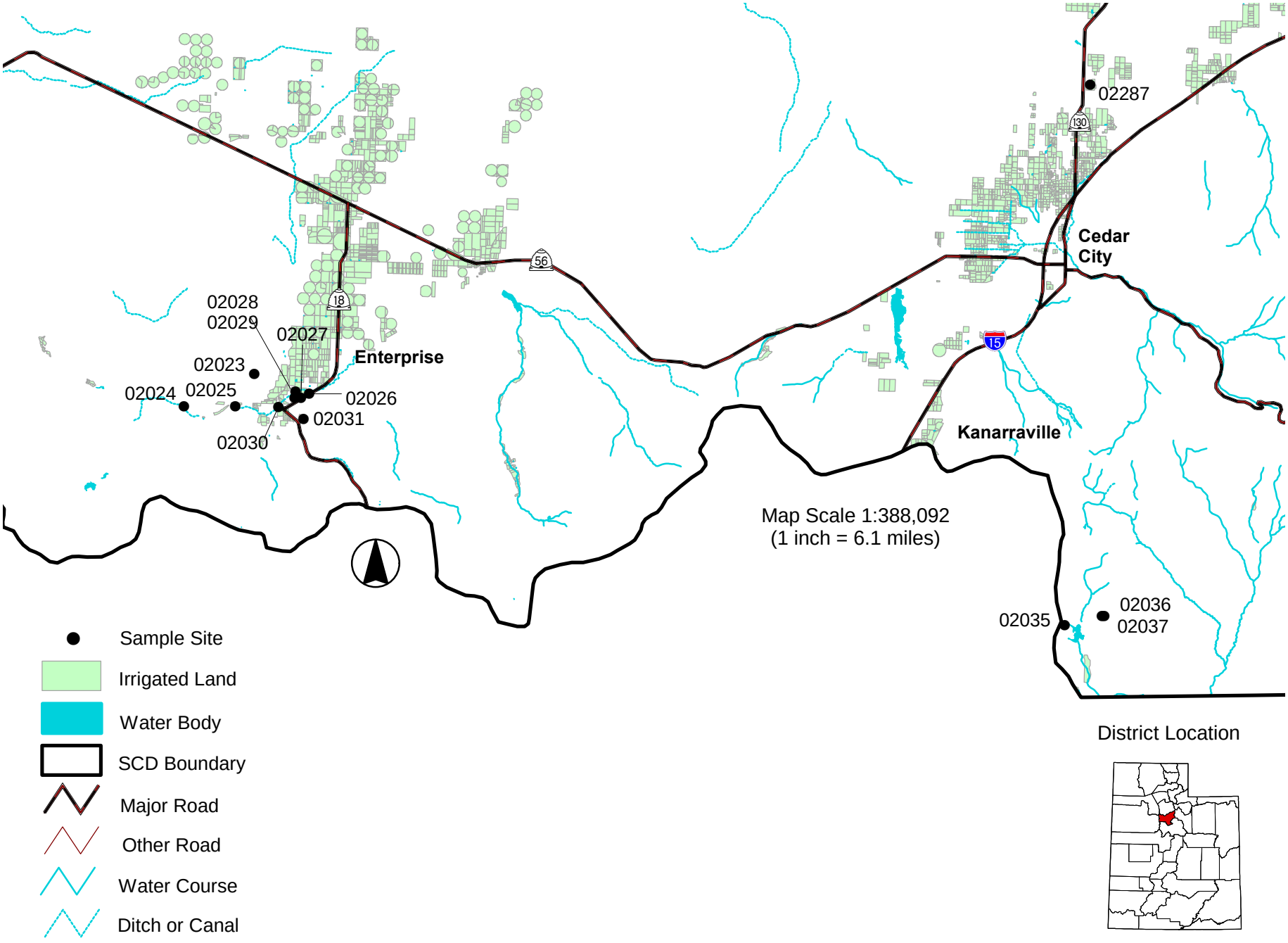
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2023	-0.1000	0.0329	-0.1000	-0.1000	-0.1000	0.0755	-0.1000	0.3	-0.1000	4.70	-0.1000	240	0.06	7.55	0	0	3.6
2024	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0201	-0.1000	1.6	-0.1000	4.60	-0.1000	240	0.09	7.90	0	0	3.4
2025	-0.1000	0.0294	-0.1000	-0.1000	-0.1000	0.0203	-0.1000	1.4	-0.1000	3.43	-0.1000	180	0.18	7.35	1	0	3.4
2026	-0.1000	0.0725	-0.1000	-0.1000	-0.1000	0.0466	-0.1000	0.7	-0.1000	4.54	-0.1000	180	1.06	6.48	0	0	3.6
2027	-0.1000	0.0747	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.6	-0.1000	4.93	-0.1000	180	0.12	7.85	0	0	3.9
2028	-0.1000	0.0236	-0.1000	-0.1000	-0.1000	0.1234	0.1109	0.1	-0.1000	2.34	-0.1000	120	-0.10	7.85	1	1	2.5
2029	-0.1000	0.1211	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	6.0	-0.1000	9.18	-0.1000	240	-0.10	7.38	0	0	5.2
2030	-0.1000	0.1083	-0.1000	-0.1000	-0.1000	0.1715	-0.1000	7.3	-0.1000	8.83	-0.1000	240	0.20	7.53	0	0	5.4
2031	-0.1000	0.0489	-0.1000	-0.1000	-0.1000	0.0594	-0.1000	1.5	-0.1000	8.39	-0.1000	180	0.10	6.81	0	0	4.3
2035	-0.1000	0.0581	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.9	-0.1000	18.64	-0.1000	240	0.05	6.85	0	0	6.6
2036	-0.1000	0.0381	-0.1000	-0.1000	0.0229	0.0226	-0.1000	0.5	-0.1000	21.53	-0.1000	300	0.10	7.30	1	0	7.6
2037	-0.1000	0.0493	-0.1000	-0.1000	-0.1000	0.1003	0.1812	0.1	-0.1000	27.20	-0.1000	300	-0.10	7.68	0	0	4.4
2287	-0.1000	0.0299	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	58.98	-0.1000	459	-0.10	7.85	1	0	6.0

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 22. E & I District



Kane County District

Two samples were collected in the Kane County District. Water tested hard with grains per gallon (gpg) ranging from 11.4 to 15.4 with a mean of 13.41. Sampled water temperature ranges from 12.5 °C to 13.0 °C, with a mean of 12.75 °C. The pH for the area has a mean of 7.99 and ranges from 7.73 to 8.24.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Samples, 2318 and 2319, in this district exceed the 750 µmhos/cm standard.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. Both samples have high bicarbonate, which is common for water in Utah.

Sample 2318 has elevated concentrations of manganese (Mn). Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca).

Sample 2319 has elevated zinc (Zn). Zinc is a micro-nutrient and is required for plant growth. However, in excess of 2 ppm it can injure plants.

No other elements were found in concentrations harmful to plants.

Livestock:

Sample 2319 has sulfur (S) exceeding the livestock standard for sulfur. Sulfur in the form of sulfate can cause water to be off flavored and may cause diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for both samples exceed the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm.

Sample 2318 has high manganese (Mn) concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Both samples have high sulfur (S). Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned

on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Sample 2319 is contaminated with coliform.

Sample Site Test Data for Kane District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2318	-0.1000	127.14	5.10	-0.1000	67.45	35.23	-0.10	7.73	12.5	653
2319	-0.1000	127.08	9.84	0.1314	136.79	101.22	-0.10	8.24	13	1024

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2318	-0.1000	0.13	9.99	-0.10	-0.1000	-0.1000	4.75	0.3374	-0.1000	-0.10	0.6	1,089
2319	-0.1000	0.21	20.75	-0.10	-0.1000	0.0348	6.67	0.0246	-0.1000	2.85	1.5	1,707

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2318	-0.1000	-0.1000	0.13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	125.39	-0.1000	653	-0.1000	-0.10
2319	-0.1000	-0.1000	0.21	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	248.31	-0.1000	1,024	-0.1000	2.85

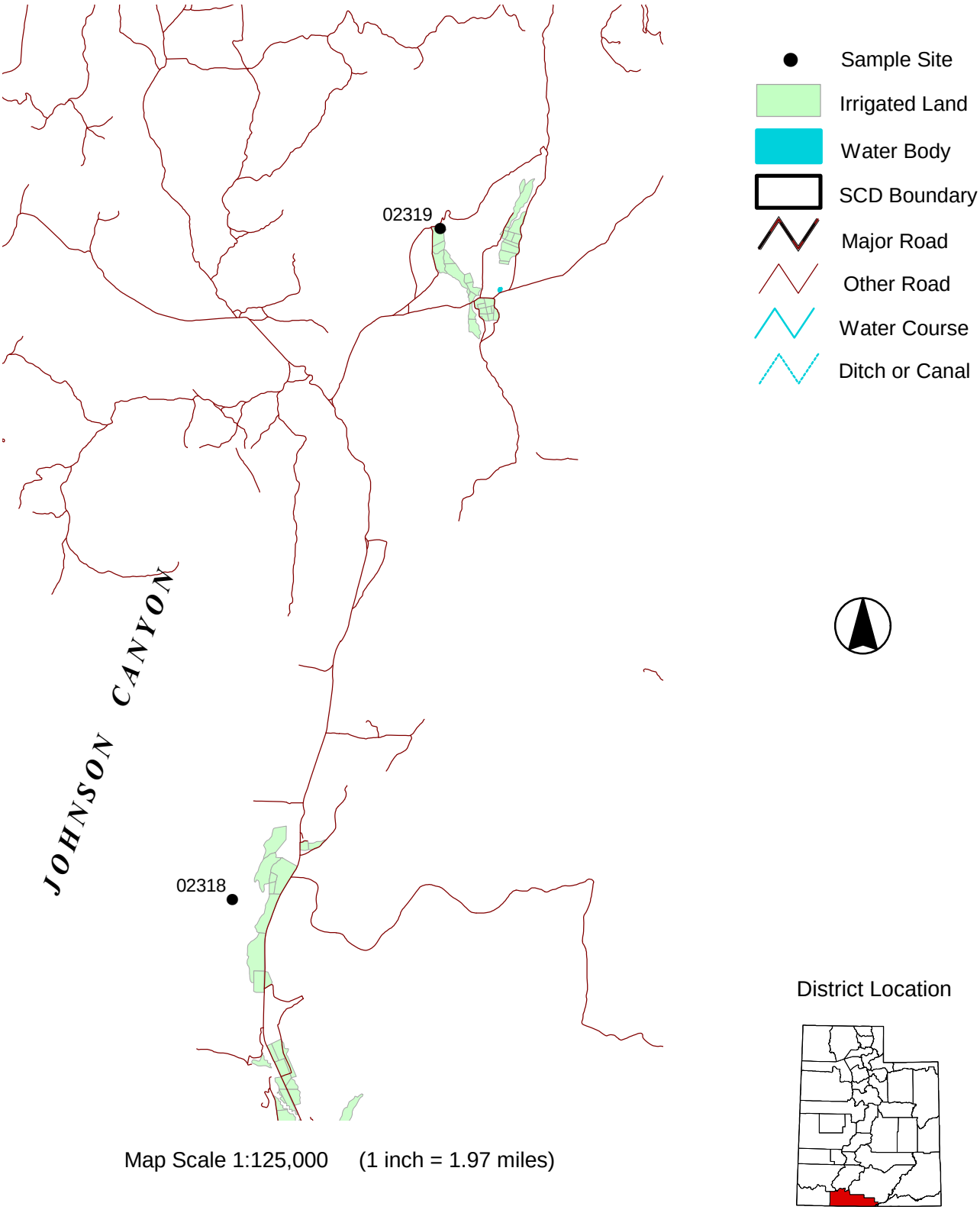
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2318	-0.1000	0.0338	-0.1000	-0.1000	-0.1000	-0.1000	0.3374	5.0	-0.1000	125.39	-0.1000	653	-0.10	7.73	0	0	11.4
2319	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0348	0.0246	-0.1	-0.1000	248.31	-0.1000	1,024	2.85	8.24	1	0	15.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 23. Kane County District



Map Scale 1:125,000 (1 inch = 1.97 miles)

Twin M District

Water in the Twin M District varies from soft to very hard with grains per gallon (gpg) ranging from 1.7 to 26.8 with a mean of 8.91. Sampled water temperature ranges from 13.3 °C to 22.1 °C, with a mean of 17.16 °C. The pH for the area has a mean of 7.88 and ranges from 7.15 to 8.61. Samples 2016, and 2018, through 2020 have high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. All samples in this district **except** 2003 through 2005, 2007, 2008, 2014, 2016 through 2020, 2167, and 2169 exceed the 750 µmhos/cm standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2004 and 2283 in this district have elevated SAR values.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples except samples 2006, 2010, 2012, 2014, and 2283 have high bicarbonate, which is common for water in Utah.

Sample 2283 has elevated boron (B), which is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small.

Chlorine (Cl), found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2006, 2009 through 2012, 2014, 2016, 2021, 2159 through 2161, 2163 through 2166, 2170, and 2283 have elevated Cl. Several of these samples also exceed the severe level (samples 2006, 2010, 2011, 2016, and 2283).

No other elements were found in concentrations harmful to plants.

Livestock:

Samples 2006, 2011, 2015, and 2021 have sulfur (S) exceeding the livestock standard for sulfur. Sulfur in the form of sulfate can cause water to be off flavored and may cause diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for eight samples exceeds the EPA aesthetic standard of 500 ppm. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Samples 2006, 2009 through 2013, 2015, 2021, 2022, 2159 through 2161, 2163 through 2166, 2170, 2257, and 2283 exceed the aesthetic standard for TDS.

Sample 2022 has high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Samples 2006, 2011, 2015, 2021, 2163, 2166, and 2170 have high sulfur. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally, people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2009, 2159, 2170, and 2283 are contaminated with coliform. Sample 2159 is also contaminated with E. coli. The well from which sample 2159 was collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Twin M District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2003	-0.1000	32.40	2.63	-0.1000	18.71	32.70	-0.10	8.26	14.4	290
2004	-0.1000	21.10	1.81	-0.1000	8.56	73.93	-0.10	8.40	14.4	319
2005	-0.1000	35.38	3.07	-0.1000	10.54	33.95	-0.10	8.02	14.4	249
2006	-0.1000	311.88	10.07	0.0547	145.58	51.31	-0.10	7.42	14.4	1686
2007	-0.1000	30.20	2.62	-0.1000	18.14	53.39	-0.10	8.33	16.7	386
2008	-0.1000	21.67	2.22	-0.1000	12.48	21.47	-0.10	8.31	15.6	180
2009	-0.1000	87.05	5.50	-0.1000	40.36	40.68	-0.10	7.96	17.8	509
2010	-0.1000	148.28	6.64	-0.1000	73.13	40.93	-0.10	8.02	15.6	890
2011	-0.1000	225.64	7.49	0.0573	103.34	152.19	-0.10	7.73	16.1	1458
2012	-0.1000	113.59	6.16	-0.1000	55.04	34.16	-0.10	7.99	16.7	738
2013	-0.1000	73.44	4.23	-0.1000	39.87	30.21	-0.10	8.33	14.4	532
2014	-0.1000	27.80	2.70	-0.1000	19.23	29.65	-0.10	8.37	21.1	258
2015	-0.1000	333.50	9.88	-0.1000	93.11	96.86	-0.10	7.40	14.4	1458
2016	-0.1000	20.99	2.21	-0.1000	11.32	24.32	-0.10	8.59	17.8	174
2017	-0.1000	35.80	3.42	-0.1000	17.63	28.15	-0.10	8.47	16.7	259
2018	-0.1000	19.16	1.78	-0.1000	9.36	35.41	-0.10	8.61	16.7	190
2019	-0.1000	20.46	2.18	-0.1000	9.55	39.91	-0.10	8.58	17.8	207
2020	-0.1000	23.38	2.37	-0.1000	9.67	42.94	-0.10	8.52	21.1	227
2021	-0.1000	274.66	9.73	-0.1000	58.31	152.85	-0.10	7.56	16.7	1362
2022	-0.1000	120.17	4.83	-0.1000	44.79	32.13	-0.10	7.84	13.3	619
2159	-0.1000	157.22	6.87	-0.1000	35.62	34.73	-0.10	7.42	14.8	695
2160	-0.1000	161.80	7.15	-0.1000	35.29	42.25	-0.10	7.47	16.2	715
2161	-0.1000	184.40	7.06	-0.1000	40.10	44.70	-0.10	7.30	16.0	803
2162	-0.1000	113.69	5.74	-0.1000	24.34	32.72	-0.10	7.36	17.6	458
2163	-0.1000	216.06	7.86	-0.1000	71.92	57.33	-0.10	7.26	18.6	1007
2164	-0.1000	148.43	6.15	-0.1000	43.70	39.11	-0.10	7.39	18.7	704
2165	-0.1000	113.04	5.08	-0.1000	37.76	43.61	-0.10	7.48	22.1	598
2166	-0.1000	197.59	7.31	0.0701	105.24	68.50	-0.10	7.15	17.1	1149
2167	-0.1000	25.51	4.06	-0.1000	7.95	22.98	-0.10	7.98	20.8	179
2168	-0.1000	110.80	5.69	-0.1000	24.91	25.80	-0.10	7.38	17.4	493
2169	-0.1000	53.58	3.90	-0.1000	34.52	41.12	-0.10	7.58	20.3	392
2170	-0.1000	193.44	5.02	-0.1000	81.26	38.85	-0.10	7.42	19.8	958
2257	-0.1000	87.59	5.82	-0.1000	22.30	81.83	-0.10	8.02	18.2	564
2283	-0.1000	55.38	3.58	0.0558	20.92	207.52	-0.10	7.98	19.8	891

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Twin M District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2003	0.0415	0.09	10.64	-0.10	-0.1000	0.1909	1.77	-0.1000	-0.1000	-0.10	1.1	484
2004	-0.1000	0.25	91.48	-0.10	-0.1000	-0.1000	1.73	-0.1000	-0.1000	-0.10	3.4	532
2005	-0.1000	0.17	23.03	-0.10	-0.1000	-0.1000	2.54	-0.1000	-0.1000	-0.10	1.3	415
2006	-0.1000	0.11	655.32	-0.10	-0.1000	0.0374	1.18	-0.1000	-0.1000	0.07	0.6	2,810
2007	-0.1000	0.09	54.30	-0.10	-0.1000	-0.1000	2.10	-0.1000	-0.1000	0.05	1.9	643
2008	-0.1000	-0.10	22.31	-0.10	-0.1000	0.0795	1.82	-0.1000	-0.1000	0.09	0.9	300
2009	-0.1000	0.10	149.23	-0.10	-0.1000	0.1213	1.80	-0.1000	-0.1000	-0.10	0.9	848
2010	-0.1000	0.08	376.30	-0.10	-0.1000	-0.1000	1.05	-0.1000	-0.1000	0.13	0.7	1,483
2011	0.1364	0.25	525.64	-0.10	-0.1000	0.1832	1.69	0.0406	-0.1000	0.09	2.1	2,430
2012	-0.1000	-0.10	312.75	-0.10	-0.1000	0.0403	1.07	-0.1000	-0.1000	0.05	0.7	1,230
2013	-0.1000	0.07	37.69	-0.10	-0.1000	0.0709	1.80	-0.1000	-0.1000	0.09	0.7	887
2014	0.0436	0.07	180.36	-0.10	-0.1000	0.0444	1.30	-0.1000	-0.1000	-0.10	1.1	430
2015	-0.1000	0.21	10.99	-0.10	-0.1000	-0.1000	1.90	-0.1000	-0.1000	-0.10	1.2	2,430
2016	-0.1000	0.07	552.81	-0.10	-0.1000	0.0354	2.56	-0.1000	-0.1000	-0.10	1.1	290
2017	-0.1000	0.07	32.66	-0.10	-0.1000	0.0285	2.17	-0.1000	-0.1000	-0.10	1.0	431
2018	-0.1000	0.09	16.58	-0.10	0.0242	0.0231	1.92	-0.1000	-0.1000	-0.10	1.7	317
2019	-0.1000	0.10	26.76	-0.10	-0.1000	-0.1000	1.90	-0.1000	-0.1000	-0.10	1.8	345
2020	-0.1000	0.12	21.89	-0.10	0.0225	-0.1000	2.00	-0.1000	-0.1000	-0.10	1.9	378
2021	-0.1000	0.38	337.92	-0.10	-0.1000	-0.1000	5.57	-0.1000	-0.1000	-0.10	2.2	2,270
2022	0.0974	0.17	126.57	-0.10	-0.1000	0.4803	2.17	-0.1000	-0.1000	0.07	0.6	1,031
2159	-0.1000	0.10	181.71	-0.10	-0.1000	0.0333	4.64	-0.1000	-0.1000	-0.10	0.7	1,158
2160	-0.1000	0.10	180.61	-0.10	-0.1000	-0.1000	4.71	-0.1000	-0.1000	-0.10	0.8	1,192
2161	-0.1000	0.12	210.61	-0.10	-0.1000	-0.1000	5.08	-0.1000	-0.1000	-0.10	0.8	1,338
2162	0.0428	0.09	68.27	-0.10	-0.1000	-0.1000	5.08	-0.1000	-0.1000	-0.10	0.7	764
2163	0.0560	0.13	281.67	-0.10	-0.1000	-0.1000	2.35	-0.1000	-0.1000	-0.10	0.9	1,678
2164	-0.1000	0.10	182.93	-0.10	-0.1000	-0.1000	2.95	-0.1000	-0.1000	-0.10	0.7	1,173
2165	0.0468	0.11	176.22	-0.10	-0.1000	-0.1000	2.56	-0.1000	-0.1000	-0.10	0.9	996
2166	0.0421	0.33	275.97	-0.10	-0.1000	-0.1000	3.76	-0.1000	-0.1000	-0.10	1.0	1,915
2167	0.0462	0.08	13.07	-0.10	-0.1000	0.0250	1.77	-0.1000	-0.1000	-0.10	1.0	299
2168	0.0494	0.08	124.96	-0.10	-0.1000	-0.1000	3.45	-0.1000	-0.1000	-0.10	0.6	822
2169	-0.1000	0.11	57.54	-0.10	-0.1000	-0.1000	2.77	-0.1000	-0.1000	0.12	1.1	653
2170	0.0502	0.10	306.94	-0.10	-0.1000	0.0422	2.00	-0.1000	-0.1000	0.06	0.6	1,597
2257	-0.1000	0.20	118.55	-0.10	-0.1000	-0.1000	4.64	-0.1000	-0.1000	0.21	2.0	940
2283	-0.1000	0.87	436.44	-0.10	-0.1000	-0.1000	1.47	-0.1000	-0.1000	-0.10	6.0	1,485

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Twin M District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2003	0.0415	-0.1000	0.0877	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	29.06	-0.1000	290	-0.1000	-0.10
2004	-0.1000	-0.1000	0.2545	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.08	-0.1000	319	-0.1000	-0.10
2005	-0.1000	-0.1000	0.1681	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.61	-0.1000	249	0.0105	-0.10
2006	-0.1000	-0.1000	0.1116	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	193.67	-0.1000	1,686	-0.1000	0.07
2007	-0.1000	-0.1000	0.0941	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.77	-0.1000	386	-0.1000	0.05
2008	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.48	-0.1000	180	-0.1000	0.09
2009	-0.1000	-0.1000	0.0993	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	60.67	-0.1000	509	-0.1000	-0.10
2010	-0.1000	-0.1000	0.0755	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	71.50	-0.1000	890	-0.1000	0.13
2011	0.1364	-0.1000	0.2550	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	178.45	-0.1000	1,458	-0.1000	0.09
2012	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	39.83	-0.1000	738	-0.1000	0.05
2013	-0.1000	-0.1000	0.0718	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	35.23	-0.1000	532	-0.1000	0.09
2014	0.0436	-0.1000	0.0742	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.61	-0.1000	258	0.0101	-0.10
2015	-0.1000	-0.1000	0.2089	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	187.12	-0.1000	1,458	-0.1000	-0.10
2016	-0.1000	-0.1000	0.0744	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.60	-0.1000	174	-0.1000	-0.10
2017	-0.1000	-0.1000	0.0740	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.79	-0.1000	259	-0.1000	-0.10
2018	-0.1000	-0.1000	0.0945	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.45	-0.1000	190	-0.1000	-0.10
2019	-0.1000	-0.1000	0.0991	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.26	-0.1000	207	-0.1000	-0.10
2020	-0.1000	-0.1000	0.1198	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	18.76	-0.1000	227	-0.1000	-0.10
2021	-0.1000	-0.1000	0.3789	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	175.22	-0.1000	1,362	-0.1000	-0.10
2022	0.0974	-0.1000	0.1684	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	77.11	-0.1000	619	-0.1000	0.07
2159	-0.1000	-0.1000	0.0989	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	37.52	-0.1000	695	-0.1000	-0.10
2160	-0.1000	-0.1000	0.0980	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	37.83	-0.1000	715	-0.1000	-0.10
2161	-0.1000	-0.1000	0.1163	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	54.30	-0.1000	803	-0.1000	-0.10
2162	0.0428	-0.1000	0.0882	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.65	-0.1000	458	-0.1000	-0.10
2163	0.0560	-0.1000	0.1317	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	147.18	-0.1000	1,007	-0.1000	-0.10
2164	-0.1000	-0.1000	0.1019	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	68.87	-0.1000	704	-0.1000	-0.10
2165	0.0468	-0.1000	0.1107	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	53.97	-0.1000	598	-0.1000	-0.10
2166	0.0421	-0.1000	0.3281	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	162.81	-0.1000	1,149	-0.1000	-0.10
2167	0.0462	0.0300	0.0754	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.80	-0.1000	179	-0.1000	-0.10
2168	0.0494	-0.1000	0.0755	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	25.49	-0.1000	493	-0.1000	-0.10
2169	-0.1000	-0.1000	0.1055	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	35.81	-0.1000	392	-0.1000	0.12
2170	0.0502	-0.1000	0.0960	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	137.64	-0.1000	958	-0.1000	0.06
2257	-0.1000	-0.1000	0.1956	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.44	-0.1000	564	-0.1000	0.21
2283	-0.1000	-0.1000	0.8695	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.35	-0.1000	891	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

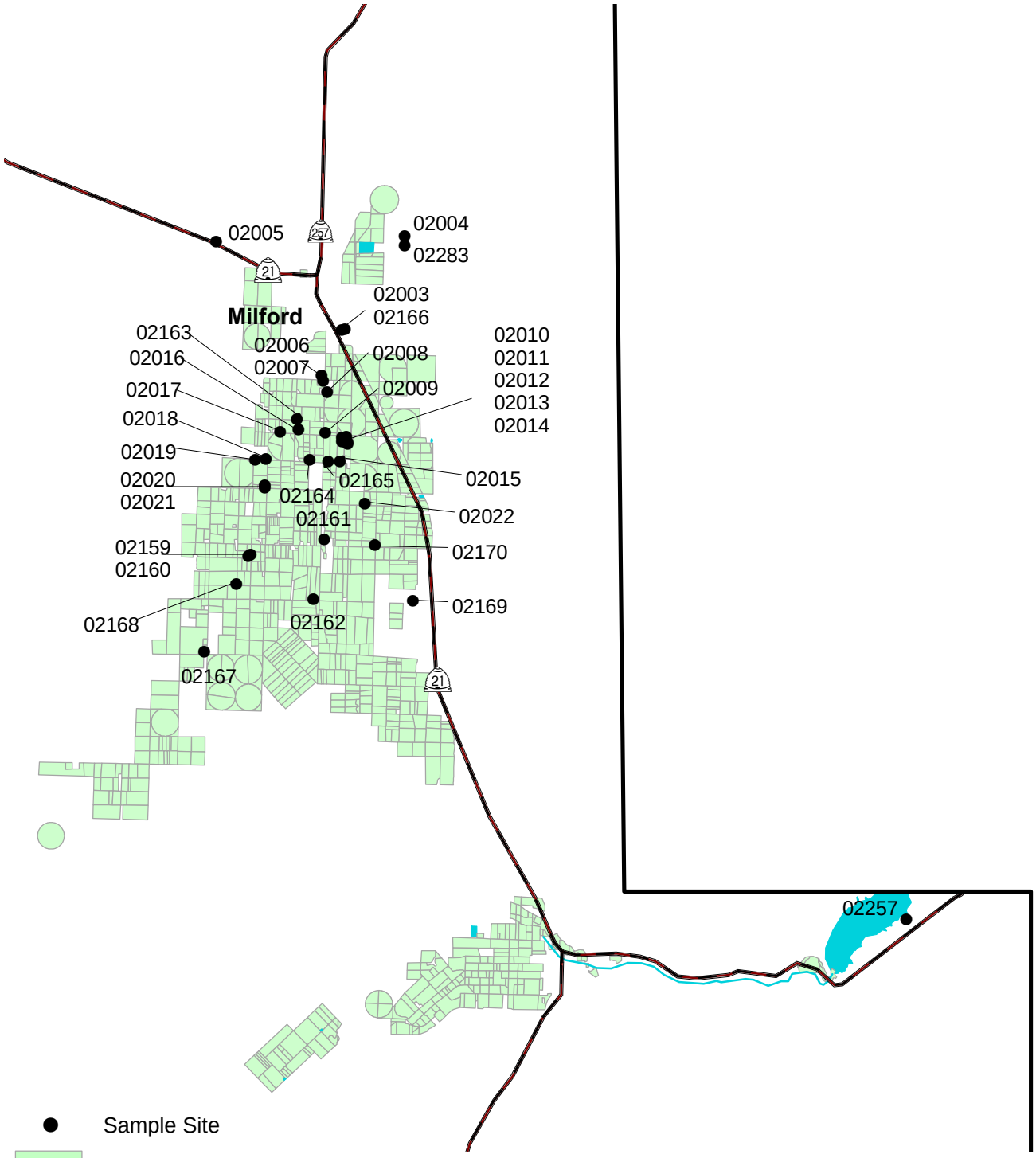
Sample Site Test Data for Twin M District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2003	-0.1000	0.1021	-0.1000	-0.1000	-0.1000	0.1909	-0.1000	0.2	-0.1000	29.06	-0.1000	290	-0.10	8.26	0	0	3.0
2004	-0.1000	0.0503	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.8	-0.1000	7.08	-0.1000	319	-0.10	8.40	0	0	1.7
2005	-0.1000	0.0882	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.8	-0.1000	13.61	-0.1000	249	-0.10	8.02	0	0	2.7
2006	-0.1000	0.1002	-0.1000	-0.1000	-0.1000	0.0374	-0.1000	0.9	-0.1000	193.67	-0.1000	1,686	0.07	7.42	0	0	26.8
2007	-0.1000	0.0596	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	27.77	-0.1000	386	0.05	8.33	0	0	2.8
2008	-0.1000	0.0325	-0.1000	-0.1000	-0.1000	0.0795	-0.1000	0.5	-0.1000	8.48	-0.1000	180	0.09	8.31	0	0	2.0
2009	-0.1000	0.0893	-0.1000	-0.1000	-0.1000	0.1213	-0.1000	0.9	-0.1000	60.67	-0.1000	509	-0.10	7.96	1	0	7.5
2010	-0.1000	0.1290	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.4	-0.1000	71.50	-0.1000	890	0.13	8.02	0	0	12.9
2011	-0.1000	0.1334	-0.1000	-0.1000	-0.1000	0.1832	0.0406	1.8	-0.1000	178.45	-0.1000	1,458	0.09	7.73	0	0	19.2
2012	-0.1000	0.1100	-0.1000	-0.1000	-0.1000	0.0403	-0.1000	1.2	-0.1000	39.83	-0.1000	738	0.05	7.99	0	0	9.9
2013	-0.1000	0.0770	-0.1000	-0.1000	-0.1000	0.0709	-0.1000	0.8	-0.1000	35.23	-0.1000	532	0.09	8.33	0	0	6.6
2014	-0.1000	0.0542	-0.1000	-0.1000	-0.1000	0.0444	-0.1000	0.3	-0.1000	22.61	-0.1000	258	-0.10	8.37	0	0	2.8
2015	-0.1000	0.0672	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.0	-0.1000	187.12	-0.1000	1,458	-0.10	7.40	0	0	24.9
2016	-0.1000	0.0316	-0.1000	-0.1000	-0.1000	0.0354	-0.1000	0.2	-0.1000	12.60	-0.1000	174	-0.10	8.59	0	0	1.9
2017	-0.1000	0.0437	-0.1000	-0.1000	-0.1000	0.0285	-0.1000	0.3	-0.1000	23.79	-0.1000	259	-0.10	8.47	0	0	3.1
2018	-0.1000	-0.1000	-0.1000	-0.1000	0.0242	0.0231	-0.1000	0.1	-0.1000	13.45	-0.1000	190	-0.10	8.61	0	0	1.7
2019	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1	-0.1000	13.26	-0.1000	207	-0.10	8.58	0	0	1.8
2020	-0.1000	0.0387	-0.1000	-0.1000	0.0225	-0.1000	-0.1000	0.2	-0.1000	18.76	-0.1000	227	-0.10	8.52	0	0	1.9
2021	-0.1000	0.0504	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.3	-0.1000	175.22	-0.1000	1,362	-0.10	7.56	0	0	19.5
2022	-0.1000	0.0972	-0.1000	-0.1000	-0.1000	0.4803	-0.1000	3.7	-0.1000	77.11	-0.1000	619	0.07	7.84	0	0	9.6
2159	-0.1000	0.0729	-0.1000	-0.1000	-0.1000	0.0333	-0.1000	2.2	-0.1000	37.52	-0.1000	695	-0.10	7.42	1	1	11.3
2160	-0.1000	0.0794	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.0	-0.1000	37.83	-0.1000	715	-0.10	7.47	0	0	11.5
2161	-0.1000	0.1209	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	54.30	-0.1000	803	-0.10	7.30	0	0	13.1
2162	-0.1000	0.0674	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	27.65	-0.1000	458	-0.10	7.36	0	0	8.1
2163	-0.1000	0.0736	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.5	-0.1000	147.18	-0.1000	1,007	-0.10	7.26	0	0	16.8
2164	-0.1000	0.0694	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	68.87	-0.1000	704	-0.10	7.39	0	0	11.2
2165	-0.1000	0.0439	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.2	-0.1000	53.97	-0.1000	598	-0.10	7.48	0	0	8.8
2166	-0.1000	0.0502	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.2	-0.1000	162.81	-0.1000	1,149	-0.10	7.15	0	0	17.7
2167	0.0300	-0.1000	-0.1000	-0.1000	-0.1000	0.0250	-0.1000	0.2	-0.1000	10.80	-0.1000	179	-0.10	7.98	0	0	2.0
2168	-0.1000	0.0501	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	25.49	-0.1000	493	-0.10	7.38	0	0	7.9
2169	-0.1000	0.0410	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.5	-0.1000	35.81	-0.1000	392	0.12	7.58	0	0	5.2
2170	-0.1000	0.0705	-0.1000	-0.1000	-0.1000	0.0422	-0.1000	5.0	-0.1000	137.64	-0.1000	958	0.06	7.42	1	0	16.1
2257	-0.1000	0.0347	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.3	-0.1000	36.44	-0.1000	564	0.21	8.02	0	0	6.4
2283	-0.1000	0.1883	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.2	-0.1000	7.35	-0.1000	891	-0.10	7.98	1	0	4.5

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 24. Twin M District



Sample Site

Irrigated Land

Water Body

SCD Boundary

Major Road

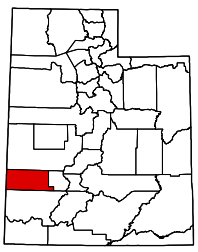
Other Road

Water Course

Ditch or Canal

Map Scale 1:176,443 (1 inch = 2.8 miles)

District Location



Upper Sevier District

Water in the Upper Sevier District varies from soft to moderate-hard with grains per gallon (gpg) ranging from 1.0 to 5.7 with a mean of 2.97. Sampled water temperature ranges from 9.2 °C to 14.2 °C, with a mean of 12.02 °C. The pH for the area has a mean of 8.16 and ranges from 7.56 to 8.75. Samples 2288, 2320, 2325, and 2326 have high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. No samples in this district exceed the 750 µmhos/cm standard.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Sample 2288 in this district has an elevated SAR value.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive concentrations, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples **except** sample 2289 have high bicarbonate, which is common for water in Utah.

Sample 2324 has elevated zinc (Zn). Zinc is a micro-nutrient and is required for plant growth. However, in excess of 2 ppm it can injure plants.

No other elements were found in concentrations harmful to plants.

Livestock:

Sample 2288 has elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

No other water quality standards for livestock were exceeded.

Culinary:

Two minerals, iron (Fe), and manganese (Mn) were found to exceed the aesthetic drinking water quality standard in some samples. Sample 2288 has high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Sample 2321 has high manganese concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association

with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2291, 2325, and 2328 are contaminated with coliform. Sample 2325 is also contaminated with E. coli. The well from which sample 2325 was collected should be inspected carefully to determine the source of contamination and should not be used for culinary purposes until the problem is corrected.

Sample Site Test Data for Upper Sevier District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2288	-0.1000	11.23	18.90	0.0667	7.11	69.99	-0.10	8.63	11.2	256
2289	-0.1000	14.57	1.07	-0.1000	2.50	24.39	-0.10	8.46	13.8	123
2290	-0.1000	56.18	1.49	-0.1000	14.24	21.09	0.14	7.56	13.8	260
2291	-0.1000	52.16	1.71	-0.1000	12.90	18.99	-0.10	7.61	12	239
2320	-0.1000	20.72	2.33	-0.1000	14.55	6.76	-0.10	8.75	13	151
2321	-0.1000	40.70	4.96	-0.1000	18.37	11.85	-0.10	8.02	9.2	219
2322	-0.1000	34.20	2.59	-0.1000	7.78	7.13	-0.10	7.68	10.8	148
2323	-0.1000	30.77	2.63	-0.1000	7.19	6.73	-0.10	7.83	9.5	160
2324	-0.1000	50.87	3.36	-0.1000	14.71	22.21	-0.10	7.93	13	305
2325	-0.1000	41.36	4.89	-0.1000	11.48	19.31	-0.10	8.52	12.4	195
2326	-0.1000	37.98	4.72	-0.1000	10.67	20.25	-0.10	8.52	11.3	203
2328	-0.1000	85.01	2.71	-0.1000	12.52	18.35	-0.10	8.36	14.2	329

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2288	-0.1000	0.14	5.28	-0.10	-0.1000	0.4731	4.11	-0.1000	-0.1000	-0.10	4.0	426
2289	-0.1000	-0.10	12.38	-0.10	-0.1000	-0.1000	1.46	-0.1000	-0.1000	-0.10	1.6	205
2290	-0.1000	-0.10	4.87	-0.10	-0.1000	-0.1000	4.21	-0.1000	-0.1000	0.21	0.7	434
2291	-0.1000	-0.10	5.11	-0.10	-0.1000	0.0252	4.00	-0.1000	-0.1000	-0.10	0.6	399
2320	-0.1000	-0.10	-0.10	-0.10	0.0773	0.0277	2.11	-0.1000	-0.1000	0.10	0.3	251
2321	-0.1000	-0.10	7.57	-0.10	0.0417	0.0314	3.45	0.0811	-0.1000	-0.10	0.4	365
2322	-0.1000	-0.10	6.21	-0.10	-0.1000	-0.1000	2.15	-0.1000	-0.1000	0.04	0.3	247
2323	-0.1000	-0.10	4.20	-0.10	-0.1000	0.0225	2.00	-0.1000	-0.1000	-0.10	0.3	266
2324	-0.1000	-0.10	21.01	-0.10	-0.1000	0.0612	3.38	0.0404	-0.1000	3.31	0.7	508
2325	-0.1000	-0.10	4.25	-0.10	-0.1000	0.0231	3.22	-0.1000	-0.1000	-0.10	0.7	325
2326	-0.1000	-0.10	4.97	-0.10	-0.1000	-0.1000	3.08	-0.1000	-0.1000	0.07	0.7	339
2328	-0.1000	-0.10	4.06	-0.10	-0.1000	0.1024	2.02	-0.1000	-0.1000	-0.10	0.5	548

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Upper Sevier District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2288	-0.1000	-0.1000	0.14	-0.1000	-0.1000	-0.1000	0.0112	-0.1000	-0.1000	2.56	-0.1000	256	-0.1000	-0.10
2289	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.37	-0.1000	123	0.0201	-0.10
2290	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.53	-0.1000	260	-0.1000	0.21
2291	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.27	-0.1000	239	-0.1000	-0.10
2320	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.26	-0.1000	151	-0.1000	0.10
2321	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.86	-0.1000	219	-0.1000	-0.10
2322	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.48	-0.1000	148	-0.1000	0.04
2323	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.30	-0.1000	160	-0.1000	-0.10
2324	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.37	-0.1000	305	-0.1000	3.31
2325	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.38	-0.1000	195	-0.1000	-0.10
2326	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.58	-0.1000	203	0.0101	0.07
2328	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	65.73	-0.1000	329	-0.1000	-0.10

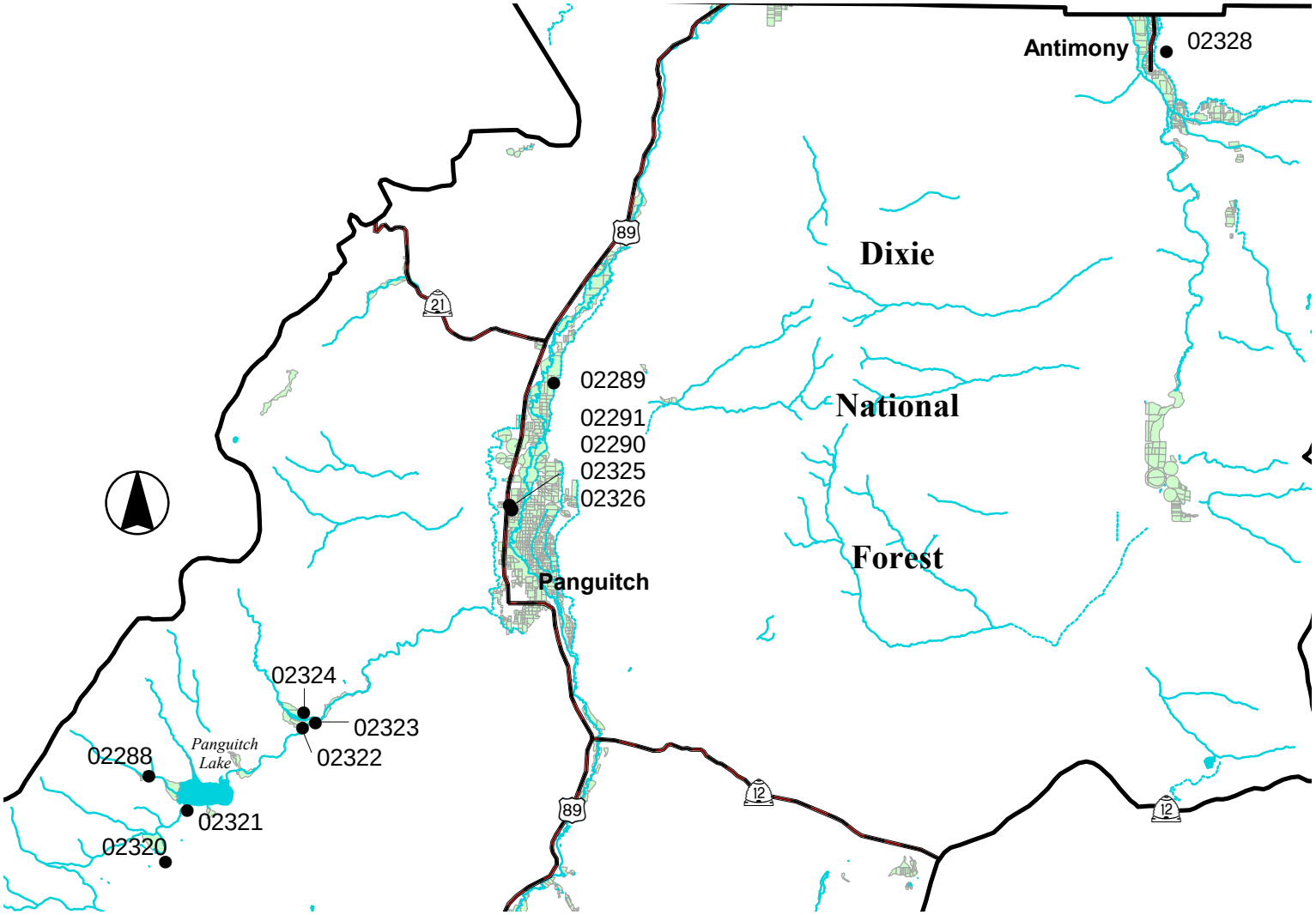
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk.
All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2288	-0.1000	0.1214	-0.1000	-0.1000	-0.1000	0.4731	-0.1000	1.2	-0.1000	2.56	-0.1000	256	-0.10	8.63	0	0	1.1
2289	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.2	-0.1000	2.37	-0.1000	123	-0.10	8.46	0	0	1.0
2290	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.2	-0.1000	2.53	-0.1000	260	0.21	7.56	0	0	4.1
2291	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0252	-0.1000	1.2	-0.1000	2.27	-0.1000	239	-0.10	7.61	1	0	3.8
2320	-0.1000	0.1562	-0.1000	-0.1000	0.0773	0.0277	-0.1000	0.2	-0.1000	1.26	-0.1000	151	0.10	8.75	0	0	2.1
2321	-0.1000	0.1538	-0.1000	-0.1000	0.0417	0.0314	0.0811	0.2	-0.1000	1.86	-0.1000	219	-0.10	8.02	0	0	3.5
2322	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	1.48	-0.1000	148	0.04	7.68	0	0	2.5
2323	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0225	-0.1000	0.3	-0.1000	1.30	-0.1000	160	-0.10	7.83	0	0	2.2
2324	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0612	0.0404	-0.1	-0.1000	8.37	-0.1000	305	3.31	7.93	0	0	3.8
2325	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0231	-0.1000	0.2	-0.1000	2.38	-0.1000	195	-0.10	8.52	1	1	3.1
2326	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.3	-0.1000	2.58	-0.1000	203	0.07	8.52	0	0	2.8
2328	-0.1000	0.0264	-0.1000	-0.1000	-0.1000	0.1024	-0.1000	-0.1	-0.1000	65.73	-0.1000	329	-0.10	8.36	1	0	5.7

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

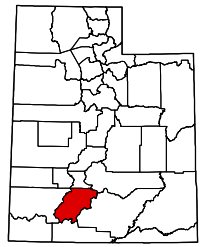
Map 25. Upper Sevier District



Sample Site
Irrigated Land
Water Body
SCD Boundary
Major Road
Other Road
Water Course
Ditch or Canal

Map Scale 1:390,666 (1 inch = 6.2 miles)

District Location



Zone 6

UACD Zone 6 consists of three districts in four counties including Daggett, Duchesne, Summit, and Uintah counties.

Forty-nine sample sites were sampled Zone 6 during the spring, summer, and fall of 2002, twenty-seven in Duchesne District and twenty-two in Uintah District. A narrative report is presented for each district. In addition to a narrative report, tables listing measured results and maps showing locations of sample sites are included. Each report covers three categories of water quality criteria—irrigation, livestock and culinary. Since water use may overlap among these categories for a single well, analytical results are compared to all three sets of criteria.

Duchesne County District

Water in the Duchesne County District varies from soft to very hard with grains per gallon (gpg) ranging from 0.2 to 16.9, with a mean of 4.66. Sampled water temperature ranges from 9.5 °C to 21.4 °C, with a mean of 14.04 °C. The pH for the area has a mean of 8.41 and ranges from 7.85 to 9.42. Samples 2061 through 2063, 2187, 2359, 2361, and 2364 have high pH and may cause alkalinity problems such as mineral buildup.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Samples 2062, 2180, 2181, 2187, 2358, 2359, 2365, and 2367 have EC values greater than 750 µmhos/cm. Sample 2367 exceeds the severe injury level of 3,000 µmhos/cm.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2062, 2063, 2187, and 2367 have elevated SAR values. Samples 2062, 2063, and 2187 exceed 9 and are a serious problem to irrigation.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected in this area have high bicarbonate, which is common for water in Utah.

Sample 2187 has elevated boron (B), which is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small.

Chlorine (Cl), found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Samples 2187 and 2367 have elevated Cl.

No other elements were found in concentrations harmful to plants.

Livestock:

Samples 2062 and 2187 have elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

Sulfate (SO_4) is shown on chemical analyses for sulfur (S). Sulfur as sulfate can cause water to be off flavored and diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Samples 2187 and 2367 have high sulfur. Sample 2367 is extremely high and should not be used for livestock.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS levels for samples 2062, 2187, 2365, and 2367 exceed the EPA aesthetic standard of 833. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 2367 also exceeds the health standard.

Samples 2061, and 2360, through 2362 have high iron. This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Samples 2061 and 2180 have high manganese (Mn) concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Samples 2061, 2062, 2187, and 2367 have high sulfur (S) which exceeds the EPA aesthetic standard of 83 ppm. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water at concentrations greater than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2063 and 2361 in this district are contaminated with coliform bacteria.

Sample Site Test Data for Duchesne County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2059	-0.1000	39.87	3.61	-0.1000	18.26	6.14	-0.10	8.44	18.1	205
2060	-0.1000	68.36	4.14	-0.1000	24.75	12.60	-0.10	8.07	16.5	312
2061	-0.1000	78.56	3.38	0.0764	10.80	77.53	-0.10	8.54	14.6	431
2062	-0.1000	24.53	3.33	0.1184	10.26	265.96	-0.10	8.77	21.4	776
2063	-0.1000	3.52	1.82	0.0572	1.67	124.53	-0.10	9.22	14.8	314
2180	-0.1000	59.46	1.22	-0.1000	33.03	72.22	-0.10	8.10	13.4	488
2181	-0.1000	77.80	1.81	-0.1000	35.34	52.67	-0.10	7.90	9.5	493
2185	-0.1000	56.02	1.17	-0.1000	17.12	11.27	-0.10	8.16	10.5	266
2187	-0.1000	2.62	1.34	0.0798	1.08	534.87	-0.10	9.42	13.1	1302
2188	-0.1000	46.72	0.98	-0.1000	16.57	12.40	-0.10	8.19	12.8	236
2189	-0.1000	66.33	1.37	-0.1000	29.69	7.96	-0.10	7.85	11.7	334
2190	-0.1000	47.87	1.61	-0.1000	13.98	12.08	-0.10	7.99	19.6	352
2353	-0.1000	53.72	3.65	-0.1000	12.26	7.42	-0.10	8.30	13.0	274
2354	-0.1000	49.97	3.26	-0.1000	11.75	4.42	-0.10	8.42	13.5	254
2355	-0.1000	53.37	3.72	-0.1000	12.95	6.85	-0.10	8.47	14.0	280
2356	-0.1000	47.34	3.76	-0.1000	14.21	4.61	-0.10	8.46	13.0	267
2357	-0.1000	53.02	4.56	-0.1000	12.09	3.66	-0.10	8.50	13.5	276
2358	-0.1000	77.41	0.46	-0.1000	39.17	8.17	-0.10	8.30	14.3	463
2359	-0.1000	59.18	5.55	-0.1000	27.15	40.68	-0.10	8.55	13.2	477
2360	-0.1000	54.06	3.17	-0.1000	28.89	13.81	-0.10	8.31	14.7	365
2361	-0.1000	51.77	3.19	-0.1000	27.84	13.19	-0.10	8.52	14.0	353
2362	-0.1000	53.37	3.34	-0.1000	17.44	11.28	-0.10	8.47	16.6	318
2363	-0.1000	54.88	3.48	-0.1000	15.99	10.34	-0.10	8.36	13.5	307
2364	-0.1000	50.32	3.17	-0.1000	14.33	4.67	-0.10	8.61	13.0	270
2365	-0.1000	76.61	4.16	-0.1000	30.19	53.47	-0.10	8.33	13.0	561
2366	-0.1000	54.25	3.91	-0.1000	27.59	17.14	-0.10	8.41	13.5	380
2367	-0.1000	133.72	5.43	0.0770	154.58	344.85	-0.10	8.28	10.3	1938

Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Duchesne County District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2059	0.0489	-0.10	-0.10	-0.10	0.0332	0.1203	2.56	0.0243	-0.1000	0.08	0.2	342
2060	-0.1000	-0.10	28.59	-0.10	-0.1000	-0.1000	2.77	-0.1000	-0.1000	0.05	0.3	520
2061	-0.1000	0.07	-0.10	-0.10	-0.1000	0.7382	2.17	0.0509	-0.1000	-0.10	2.2	719
2062	0.2584	0.13	-0.10	-0.10	-0.1000	0.1508	6.36	-0.1000	-0.1000	-0.10	11.4	1,293
2063	-0.1000	0.09	-0.10	0.58	-0.1000	0.0818	3.49	-0.1000	-0.1000	-0.10	13.7	524
2180	-0.1000	0.13	35.46	-0.10	-0.1000	0.1174	5.49	0.0915	-0.1000	-0.10	1.9	813
2181	-0.1000	0.10	38.08	-0.10	-0.1000	0.0715	5.32	-0.1000	-0.1000	-0.10	1.2	822
2185	-0.1000	-0.10	6.12	-0.10	-0.1000	-0.1000	3.24	-0.1000	-0.1000	0.04	0.3	444
2187	-0.1000	1.22	149.95	1.13	-0.1000	-0.1000	6.09	-0.1000	-0.1000	-0.10	70.2	2,170
2188	-0.1000	-0.10	10.85	-0.10	-0.1000	-0.1000	3.16	-0.1000	-0.1000	-0.10	0.4	394
2189	-0.1000	-0.10	9.60	-0.10	-0.1000	-0.1000	4.91	-0.1000	-0.1000	-0.10	0.2	557
2190	-0.1000	-0.10	11.45	-0.10	0.0230	-0.1000	4.07	-0.1000	-0.1000	0.10	0.4	587
2353	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.1638	2.70	-0.1000	-0.1000	-0.10	0.2	457
2354	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.1248	2.43	0.0208	-0.1000	-0.10	0.1	424
2355	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.1355	2.70	0.0220	-0.1000	-0.10	0.2	466
2356	-0.1000	-0.10	-0.10	-0.10	0.0269	0.1000	2.48	0.0279	-0.1000	-0.10	0.2	445
2357	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0881	2.17	0.0216	-0.1000	-0.10	0.1	460
2358	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	5.63	-0.1000	-0.1000	-0.10	0.2	771
2359	-0.1000	-0.10	49.32	-0.10	-0.1000	0.0373	2.72	-0.1000	-0.1000	-0.10	1.1	795
2360	-0.1000	-0.10	6.37	-0.10	-0.1000	0.3159	3.82	-0.1000	-0.1000	-0.10	0.4	609
2361	-0.1000	-0.10	6.13	-0.10	-0.1000	0.4041	3.76	0.0339	-0.1000	-0.10	0.4	589
2362	-0.1000	-0.10	-0.10	-0.10	0.0311	0.4042	3.28	0.0342	-0.1000	0.07	0.3	530
2363	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.2537	3.12	-0.1000	-0.1000	-0.10	0.3	511
2364	0.0422	-0.10	-0.10	-0.10	-0.1000	0.1781	2.52	0.0258	-0.1000	-0.10	0.1	450
2365	-0.1000	0.08	34.45	-0.10	-0.1000	0.1229	3.88	-0.1000	-0.1000	-0.10	1.3	935
2366	0.0535	-0.10	4.64	-0.10	-0.1000	0.0454	3.53	-0.1000	-0.1000	-0.10	0.5	634
2367	-0.1000	0.62	256.47	-0.10	-0.1000	0.1739	5.37	-0.1000	-0.1000	0.16	4.8	3,230

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Duchesne County District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2059	0.0489	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	17.07	-0.1000	205	-0.1000	0.08
2060	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	28.13	-0.1000	312	-0.1000	0.05
2061	-0.1000	-0.1000	0.0744	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	96.09	-0.1000	431	-0.1000	-0.10
2062	0.2584	-0.1000	0.1313	-0.1000	-0.1000	-0.1000	0.0146	-0.1000	-0.1000	110.82	-0.1000	776	-0.1000	-0.10
2063	-0.1000	-0.1000	0.0942	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.53	-0.1000	314	-0.1000	-0.10
2180	-0.1000	-0.1000	0.1306	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	36.57	-0.1000	488	-0.1000	-0.10
2181	-0.1000	-0.1000	0.1037	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	43.02	-0.1000	493	-0.1000	-0.10
2185	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	20.04	-0.1000	266	-0.1000	0.04
2187	-0.1000	-0.1000	1.2157	-0.1000	-0.1000	-0.1000	0.0167	-0.1000	-0.1000	186.37	-0.1000	1,302	-0.1000	-0.10
2188	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.38	-0.1000	236	-0.1000	-0.10
2189	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.71	-0.1000	334	-0.1000	-0.10
2190	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.93	-0.1000	352	-0.1000	0.10
2353	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.57	-0.1000	274	-0.1000	-0.10
2354	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.74	-0.1000	254	-0.1000	-0.10
2355	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.64	-0.1000	280	-0.1000	-0.10
2356	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.35	-0.1000	267	-0.1000	-0.10
2357	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.97	-0.1000	276	-0.1000	-0.10
2358	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.70	-0.1000	463	0.0664	-0.10
2359	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	35.93	-0.1000	477	-0.1000	-0.10
2360	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.37	-0.1000	365	-0.1000	-0.10
2361	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.35	-0.1000	353	-0.1000	-0.10
2362	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.34	-0.1000	318	-0.1000	0.07
2363	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.05	-0.1000	307	-0.1000	-0.10
2364	0.0422	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	15.43	-0.1000	270	-0.1000	-0.10
2365	-0.1000	-0.1000	0.0828	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	47.52	-0.1000	561	-0.1000	-0.10
2366	0.0535	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	23.11	-0.1000	380	-0.1000	-0.10
2367	-0.1000	-0.1000	0.6186	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	357.30	-0.1000	1,938	-0.1000	0.16

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

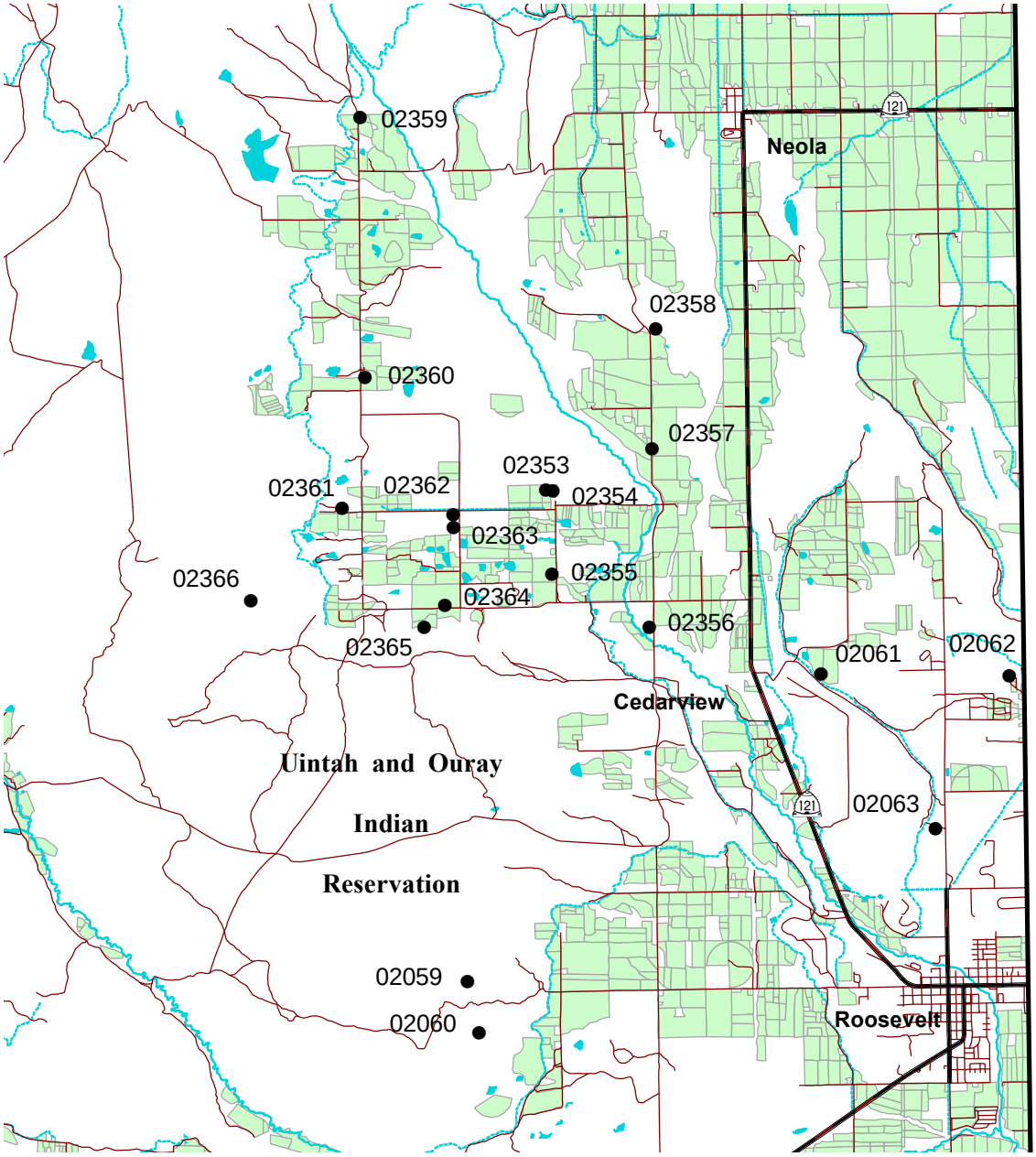
Sample Site Test Data for Duchesne County District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2059	-0.1000	0.0521	-0.1000	-0.1000	0.0332	0.1203	0.0243	0.1	-0.1000	17.07	-0.1000	205	0.08	8.44	0	0	3.4
2060	-0.1000	0.0643	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	28.13	-0.1000	312	0.05	8.07	0	0	5.4
2061	-0.1000	0.0925	-0.1000	-0.1000	-0.1000	0.7382	0.0509	-0.1	-0.1000	96.09	-0.1000	431	-0.10	8.54	0	0	5.2
2062	-0.1000	0.0424	-0.1000	-0.1000	-0.1000	0.1508	-0.1000	0.1	-0.1000	110.82	-0.1000	776	-0.10	8.77	0	0	2.0
2063	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0818	-0.1000	0.1	-0.1000	22.53	-0.1000	314	-0.10	9.22	1	0	0.3
2180	-0.1000	0.0909	-0.1000	-0.1000	-0.1000	0.1174	0.0915	-0.1	-0.1000	36.57	-0.1000	488	-0.10	8.10	0	0	5.4
2181	-0.1000	0.0410	-0.1000	-0.1000	-0.1000	0.0715	-0.1000	0.7	-0.1000	43.02	-0.1000	493	-0.10	7.90	0	0	6.6
2185	-0.1000	0.0749	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	20.04	-0.1000	266	0.04	8.16	0	0	4.3
2187	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	186.37	-0.1000	1,302	-0.10	9.42	0	0	0.2
2188	-0.1000	0.1170	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.3	-0.1000	10.38	-0.1000	236	-0.10	8.19	0	0	3.7
2189	-0.1000	0.2234	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.0	-0.1000	12.71	-0.1000	334	-0.10	7.85	0	0	5.6
2190	-0.1000	0.0968	-0.1000	-0.1000	0.0230	-0.1000	-0.1000	0.7	-0.1000	3.93	-0.1000	352	0.10	7.99	0	0	3.6
2353	-0.1000	0.0694	-0.1000	-0.1000	-0.1000	0.1638	-0.1000	0.0	-0.1000	13.57	-0.1000	274	-0.10	8.30	0	0	3.9
2354	-0.1000	0.0648	-0.1000	-0.1000	-0.1000	0.1248	0.0208	0.0	-0.1000	13.74	-0.1000	254	-0.10	8.42	0	0	3.6
2355	-0.1000	0.0645	-0.1000	-0.1000	-0.1000	0.1355	0.0220	0.0	-0.1000	13.64	-0.1000	280	-0.10	8.47	0	0	3.9
2356	-0.1000	0.0580	-0.1000	-0.1000	0.0269	0.1000	0.0279	0.1	-0.1000	15.35	-0.1000	267	-0.10	8.46	0	0	3.6
2357	-0.1000	0.0439	-0.1000	-0.1000	-0.1000	0.0881	0.0216	0.1	-0.1000	22.97	-0.1000	276	-0.10	8.50	0	0	3.8
2358	-0.1000	0.1873	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.2	-0.1000	10.70	-0.1000	463	-0.10	8.30	0	0	6.8
2359	-0.1000	0.0792	-0.1000	-0.1000	-0.1000	0.0373	-0.1000	1.4	-0.1000	35.93	-0.1000	477	-0.10	8.55	0	0	5.0
2360	-0.1000	0.0846	-0.1000	-0.1000	-0.1000	0.3159	-0.1000	-0.1	-0.1000	14.37	-0.1000	365	-0.10	8.31	0	0	4.9
2361	-0.1000	0.0678	-0.1000	-0.1000	-0.1000	0.4041	0.0339	0.1	-0.1000	12.35	-0.1000	353	-0.10	8.52	1	0	4.7
2362	-0.1000	0.0724	-0.1000	-0.1000	0.0311	0.4042	0.0342	0.1	-0.1000	12.34	-0.1000	318	0.07	8.47	0	0	4.1
2363	-0.1000	0.0702	-0.1000	-0.1000	-0.1000	0.2537	-0.1000	-0.1	-0.1000	13.05	-0.1000	307	-0.10	8.36	0	0	4.1
2364	-0.1000	0.0574	-0.1000	-0.1000	-0.1000	0.1781	0.0258	-0.1	-0.1000	15.43	-0.1000	270	-0.10	8.61	0	0	3.8
2365	-0.1000	0.0548	-0.1000	-0.1000	-0.1000	0.1229	-0.1000	0.4	-0.1000	47.52	-0.1000	561	-0.10	8.33	0	0	6.2
2366	-0.1000	0.0487	-0.1000	-0.1000	-0.1000	0.0454	-0.1000	0.1	-0.1000	23.11	-0.1000	380	-0.10	8.41	0	0	4.8
2367	-0.1000	0.0673	-0.1000	-0.1000	-0.1000	0.1739	-0.1000	1.0	-0.1000	357.30	-0.1000	1,938	0.16	8.28	0	0	16.9

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

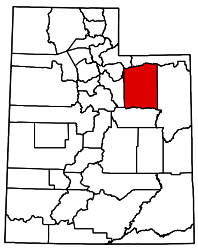
Map 26. Duchesne County District, East Section



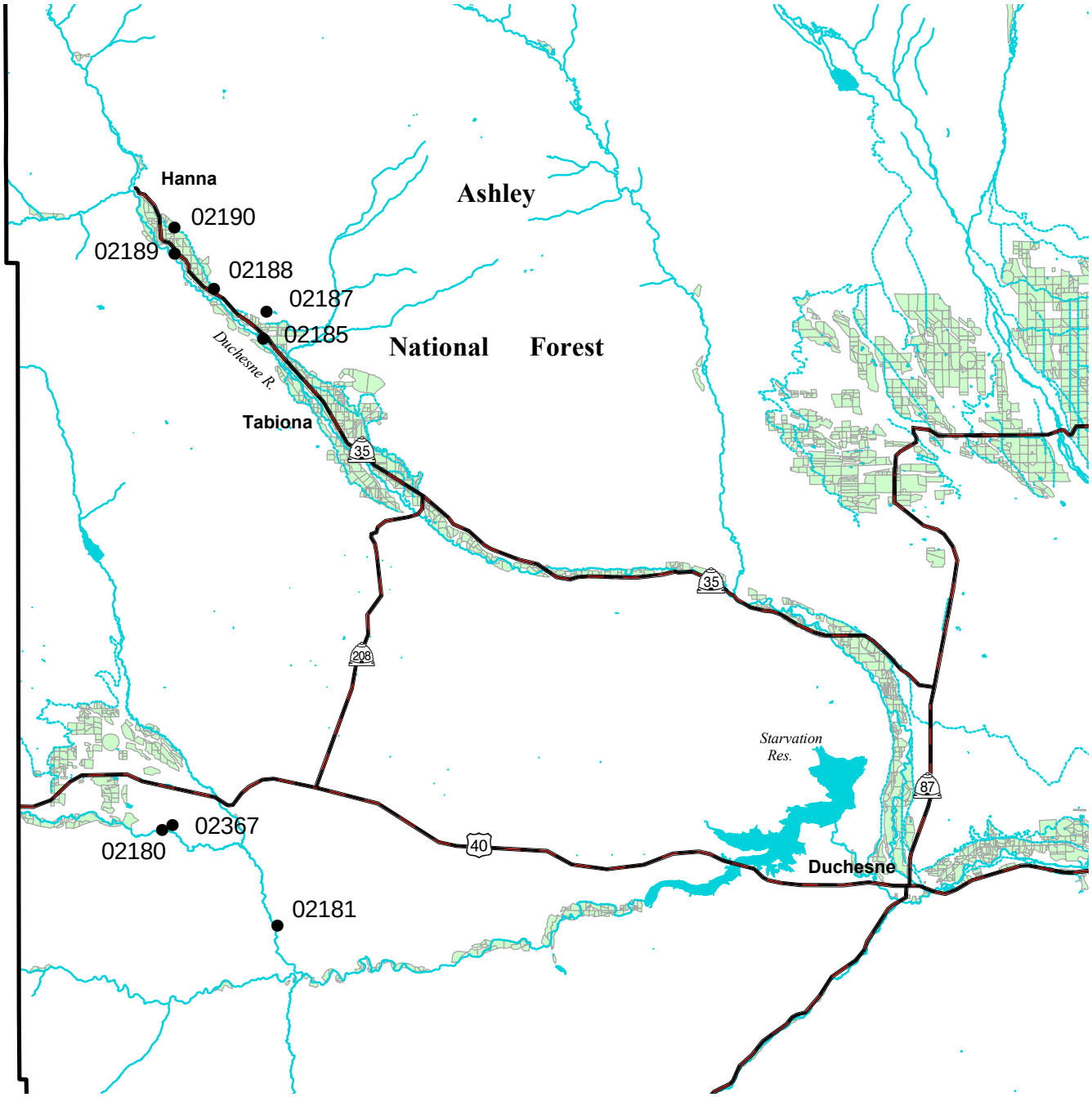
Map Scale 1:114,649 (1 inch = 1.8 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



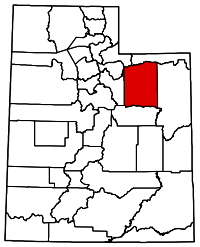
Map 27. Duchesne County District, West Section



Map Scale 1:292,799 (1 inch = 4.62 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Uintah County District

Water in the Uintah County District varies from soft to very hard with grains per gallon (gpg) ranging from 0.8 to 69.4, with a mean of 10.88. Sampled water temperature ranges from 9.5 °C to 18.9 °C, with a mean of 12.28 °C. The pH for the area has a mean of 7.81 and ranges from 7.24 to 8.45.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Samples 2045, 2046, 2050, 2057, 2058, 2183, 2184, and 2347 through 2352 have EC values greater than 750 µmhos/cm. Sample 2184 exceeds the severe injury level of 3,000 µmhos/cm.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. Samples 2044, 2058, and 2184 have elevated SAR values. Samples 2058 and 2184 exceed 9 and are a serious problem to irrigation.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples collected in this area except 2351 have high bicarbonate, which is common for water in Utah. Sample 2184 exceeds the severe level.

Sample 2184 has elevated boron (B), which is toxic to sensitive plants when concentration exceeds 0.7 ppm. It will cause severe injury at 10.0 ppm. However, boron in trace amounts is required for proper plant growth. It is important to monitor this element because the margin separating safe health from toxicity is small.

Chlorine (Cl), found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm, and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Sample 2184 has elevated Cl.

Samples 2184 and 2351 have elevated concentrations of manganese (Mn). Manganese above 0.2 ppm can injure plants and cause reduction in dry matter production. Excess manganese interferes with the plant's ability to use other nutrients such as calcium (Ca).

Sample 2184 exceeds the irrigation water standard for selenium (Se). This water should not be used for irrigation without special treatment.

No other elements were found in concentrations harmful to plants.

Livestock:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Livestock watering standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. Values above

5,000 ppm are too high in salts for most livestock. Usually livestock will not drink water of this quality unless forced. Sample 2184 exceeds the salinity standard for livestock.

Samples 2044 and 2045 have elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

Sample 2184 exceeds the livestock health standard for selenium (Se). This water should not be used for livestock watering without special treatment.

Sulfate (SO_4) is shown on chemical analyses for sulfur (S). Sulfur as sulfate can cause water to be off flavored and diarrhea in animals not used to drinking it. Problems start when the sulfur level in water exceeds 167 ppm. Samples 2046, 2050, 2057, 2183, and 2184 have high sulfur. Sulfate concentrations for samples 2183 and 2184 are extremely high and should not be used for livestock.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS levels for samples 2046, 2050, 2057, 2058, 2183, 2184, 2347, 2349, and 2351 exceed the EPA aesthetic standard of 833. At this level the water may be off-flavored but it is not a health problem until TDS reaches 2,000 ppm. Sample 2184 exceeds the health standard for TDS.

Samples 2184, 2351, and 2352 have high manganese (Mn) concentration. EPA has set an aesthetic standard of 0.05 ppm for manganese. Water with high concentrations may cause discoloration of plumbing fixtures and have poor flavor.

Sample 2184 exceeds the EPA nitrate (NO_3) standard of 10 ppm nitrate expressed as nitrogen (NO_3-N). NO_3 is an important nutrient for plant growth. It is found in nitrogen fertilizers, manure, septic systems, and some minerals. NO_3 is toxic to young infants (usually less than 6 months of age) and causes “blue baby syndrome.” NO_3 can only be removed from water by reverse osmosis or distillation.

Sample 2184 exceeds the EPA primary standard for selenium (Se). This water should not be used for drinking without special treatment.

Samples 2046, 2050, 2057, 2058, 2183, 2184, 2346, and 2351 have high sulfur (S) which exceeds the EPA aesthetic standard of 83 ppm. Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water at concentrations greater than 83 ppm sulfur. Bacteria in the water metabolize sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present, high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2183, 2184, 2349, and 2351 in this district are contaminated with coliform bacteria.

Sample Site Test Data for Uintah County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2044	-0.1000	15.21	6.13	0.0749	6.71	87.50	-0.10	8.35	12.1	289
2045	-0.1000	89.02	8.02	0.0701	33.53	38.80	-0.10	7.52	10.5	481
2046	-0.1000	216.36	2.59	-0.1000	72.17	16.54	-0.10	7.45	10.9	871
2047	-0.1000	60.26	0.73	-0.1000	21.15	2.30	-0.10	7.72	9.8	251
2048	-0.1000	64.52	0.83	-0.1000	19.82	2.31	-0.10	7.71	11.8	256
2049	-0.1000	69.29	0.58	-0.1000	16.90	2.60	-0.10	7.80	10.5	270
2050	-0.1000	272.10	2.01	-0.1000	57.71	11.52	-0.10	7.28	11.2	894
2051	-0.1000	83.17	0.86	-0.1000	18.74	3.42	-0.10	7.73	12.8	322
2052	-0.1000	73.46	0.89	-0.1000	19.59	3.55	-0.10	7.68	9.5	298
2053	-0.1000	68.13	0.88	-0.1000	18.23	2.85	-0.10	7.77	12.2	268
2054	-0.1000	56.11	0.50	-0.1000	12.28	1.81	-0.10	8.01	14.1	206
2055	-0.1000	59.03	0.56	-0.1000	13.19	2.29	-0.10	7.78	12.3	217
2056	-0.1000	73.29	1.75	-0.1000	38.74	14.13	-0.10	7.82	14.8	389
2057	-0.1000	286.90	3.08	-0.1000	71.77	15.89	-0.10	7.48	12.4	1013
2058	-0.1000	12.63	3.22	-0.1000	1.47	213.70	-0.10	7.55	18.9	575
2183	-0.1000	419.04	2.51	-0.1000	54.73	15.58	-0.10	7.82	11.9	1123
2184	-0.1000	569.92	27.89	1.6590	617.06	1492.32	-0.10	7.24	17.0	5526
2346	-0.1000	68.41	5.00	0.0738	37.02	61.93	-0.10	7.90	12.0	399
2347	-0.1000	87.13	0.65	-0.1000	33.39	7.46	-0.10	8.02	10.5	503
2348	-0.1000	88.56	1.63	-0.1000	27.57	5.20	-0.10	8.02	14.5	481
2349	-0.1000	108.51	2.69	-0.1000	53.99	14.80	-0.10	7.90	10.5	658
2350	-0.1000	90.14	1.64	-0.1000	26.43	8.28	-0.10	8.10	10.0	469
2351	-0.1000	72.66	3.26	-0.1000	62.40	48.34	-0.10	8.45	13.5	786
2352	-0.1000	96.19	1.71	-0.1000	29.18	10.66	-0.10	8.13	11.0	485

Values of -0.1 are below detection limits of testing procedure

Sample Site Test Data for Uintah County District

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2044	-0.1000	0.15	-0.10	-0.10	-0.1000	0.0435	3.41	-0.1000	-0.1000	0.05	4.7	481
2045	-0.1000	0.10	15.27	-0.10	-0.1000	0.1736	4.71	-0.1000	-0.1000	-0.10	0.9	801
2046	-0.1000	0.11	16.20	-0.10	-0.1000	0.0669	5.04	-0.1000	-0.1000	0.05	0.2	1,452
2047	-0.1000	-0.10	-0.10	-0.10	0.0249	-0.1000	4.19	-0.1000	-0.1000	0.05	0.1	419
2048	-0.1000	-0.10	-0.10	-0.10	0.0242	-0.1000	4.09	-0.1000	-0.1000	0.04	0.1	426
2049	-0.1000	-0.10	-0.10	-0.10	-0.1000	-0.1000	3.69	-0.1000	-0.1000	-0.10	0.1	450
2050	-0.1000	0.11	-0.10	-0.10	-0.1000	0.0503	4.75	0.0256	-0.1000	0.05	0.2	1,490
2051	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.1070	3.65	-0.1000	-0.1000	0.05	0.1	536
2052	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0327	3.76	-0.1000	-0.1000	-0.10	0.1	496
2053	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0692	3.88	-0.1000	-0.1000	-0.10	0.1	446
2054	-0.1000	-0.10	-0.10	-0.10	0.0321	0.0779	3.34	-0.1000	-0.1000	0.04	0.1	343
2055	0.1221	-0.10	-0.10	-0.10	0.0942	0.0860	3.47	0.0201	-0.1000	0.11	0.1	362
2056	-0.1000	-0.10	15.92	-0.10	-0.1000	-0.1000	4.79	-0.1000	-0.1000	0.07	0.3	648
2057	-0.1000	0.12	8.34	-0.10	0.0341	0.0378	3.98	-0.1000	-0.1000	0.08	0.2	1,688
2058	-0.1000	0.08	4.43	-0.10	0.0326	0.0743	4.64	0.0479	-0.1000	0.18	15.2	958
2183	-0.1000	0.12	3.95	-0.10	-0.1000	-0.1000	4.77	-0.1000	-0.1000	-0.10	0.2	1,872
2184	-0.1000	1.47	222.93	-0.10	-0.1000	0.0757	10.11	0.2227	1.4425	-0.10	10.3	9,210
2346	-0.1000	-0.10	12.79	-0.10	-0.1000	-0.1000	2.43	-0.1000	-0.1000	-0.10	1.5	665
2347	-0.1000	-0.10	-0.10	-0.10	-0.1000	0.0293	5.78	-0.1000	-0.1000	-0.10	0.2	838
2348	-0.1000	-0.10	3.46	-0.10	-0.1000	0.0366	3.86	-0.1000	-0.1000	0.15	0.1	801
2349	-0.1000	-0.10	6.04	-0.10	-0.1000	-0.1000	5.34	-0.1000	-0.1000	-0.10	0.3	1,096
2350	-0.1000	-0.10	5.28	-0.10	-0.1000	0.0263	3.67	-0.1000	-0.1000	-0.10	0.2	781
2351	-0.1000	0.13	20.35	-0.10	-0.1000	-0.1000	1.05	0.5318	-0.1000	0.41	1.0	1,310
2352	-0.1000	-0.10	5.05	-0.10	-0.1000	0.0921	3.69	0.0551	-0.1000	-0.10	0.2	809

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for Uintah County District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2044	-0.1000	-0.1000	0.1457	-0.1000	-0.1000	-0.1000	0.2358	-0.1000	-0.1000	24.49	-0.1000	289	-0.1000	0.05
2045	-0.1000	-0.1000	0.1049	-0.1000	-0.1000	-0.1000	0.0427	-0.1000	-0.1000	54.23	-0.1000	481	-0.1000	-0.10
2046	-0.1000	-0.1000	0.1103	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	192.52	-0.1000	871	-0.1000	0.05
2047	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	4.29	-0.1000	251	-0.1000	0.05
2048	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	5.90	-0.1000	256	-0.1000	0.04
2049	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	14.98	-0.1000	270	-0.1000	-0.10
2050	-0.1000	-0.1000	0.1101	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	228.55	-0.1000	894	-0.1000	0.05
2051	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	30.55	-0.1000	322	-0.1000	0.05
2052	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	20.98	-0.1000	298	-0.1000	-0.10
2053	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	12.34	-0.1000	268	-0.1000	-0.10
2054	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	2.96	-0.1000	206	-0.1000	0.04
2055	0.1221	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	3.94	-0.1000	217	-0.1000	0.11
2056	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	27.05	-0.1000	389	-0.1000	0.07
2057	-0.1000	-0.1000	0.1219	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	276.76	-0.1000	1,013	-0.1000	0.08
2058	-0.1000	-0.1000	0.0780	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	83.12	-0.1000	575	-0.1000	0.18
2183	-0.1000	-0.1000	0.1245	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	368.12	-0.1000	1,123	-0.1000	-0.10
2184	-0.1000	-0.1000	1.4672	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1306.43	1.4425	5,526	-0.1000	-0.10
2346	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	101.41	-0.1000	399	-0.1000	-0.10
2347	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	13.29	-0.1000	503	-0.1000	-0.10
2348	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	44.24	-0.1000	481	-0.1000	0.15
2349	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	72.61	-0.1000	658	-0.1000	-0.10
2350	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	45.15	-0.1000	469	-0.1000	-0.10
2351	-0.1000	-0.1000	0.1304	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	148.50	-0.1000	786	-0.1000	0.41
2352	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	52.49	-0.1000	485	-0.1000	-0.10

Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

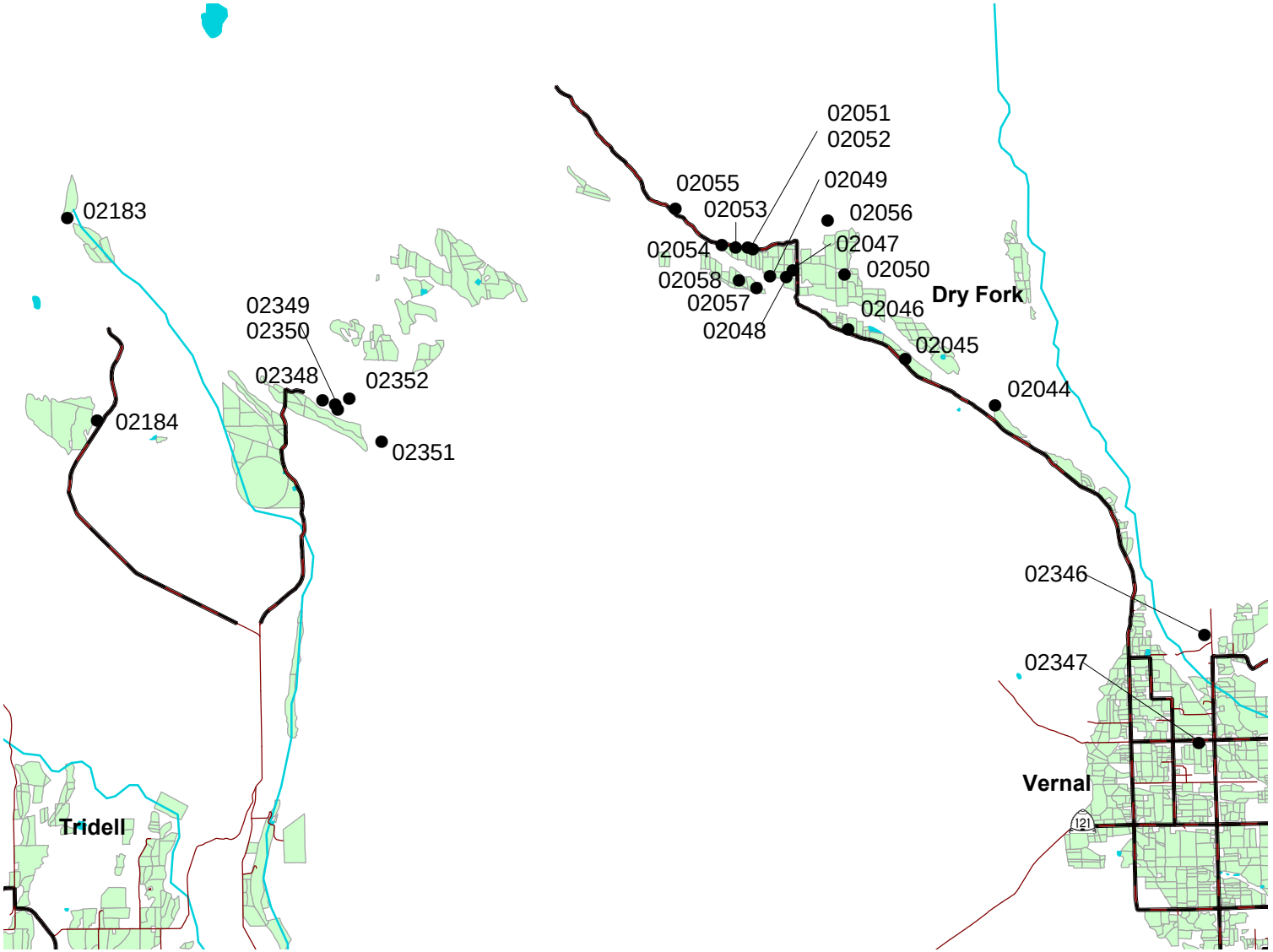
Sample Site Test Data for Uintah County District

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2044	-0.1000	0.0254	-0.1000	-0.1000	-0.1000	0.0435	-0.1000	-0.1	-0.1000	24.49	-0.1000	289	0.05	8.35	0	0	1.3
2045	-0.1000	0.0294	-0.1000	-0.1000	-0.1000	0.1736	-0.1000	-0.1	-0.1000	54.23	-0.1000	481	-0.10	7.52	0	0	7.2
2046	-0.1000	0.0661	-0.1000	-0.1000	-0.1000	0.0669	-0.1000	1.8	-0.1000	192.52	-0.1000	871	0.05	7.45	0	0	16.9
2047	-0.1000	0.1185	-0.1000	-0.1000	0.0249	-0.1000	-0.1000	0.3	-0.1000	4.29	-0.1000	251	0.05	7.72	0	0	4.8
2048	-0.1000	0.1338	-0.1000	-0.1000	0.0242	-0.1000	-0.1000	0.3	-0.1000	5.90	-0.1000	256	0.04	7.71	0	0	4.9
2049	-0.1000	0.1358	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1	-0.1000	14.98	-0.1000	270	-0.10	7.80	0	0	5.0
2050	-0.1000	0.0236	-0.1000	-0.1000	-0.1000	0.0503	0.0256	0.9	-0.1000	228.55	-0.1000	894	0.05	7.28	0	0	19.3
2051	-0.1000	0.0533	-0.1000	-0.1000	-0.1000	0.1070	-0.1000	-0.1	-0.1000	30.55	-0.1000	322	0.05	7.73	0	0	6.0
2052	-0.1000	0.0499	-0.1000	-0.1000	-0.1000	0.0327	-0.1000	-0.1	-0.1000	20.98	-0.1000	298	-0.10	7.68	0	0	5.4
2053	-0.1000	0.0710	-0.1000	-0.1000	-0.1000	0.0692	-0.1000	-0.1	-0.1000	12.34	-0.1000	268	-0.10	7.77	0	0	5.1
2054	-0.1000	0.1266	-0.1000	-0.1000	0.0321	0.0779	-0.1000	0.1	-0.1000	2.96	-0.1000	206	0.04	8.01	0	0	4.0
2055	-0.1000	0.1339	-0.1000	-0.1000	0.0942	0.0860	0.0201	-0.1	-0.1000	3.94	-0.1000	217	0.11	7.78	0	0	4.2
2056	-0.1000	0.0610	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.3	-0.1000	27.05	-0.1000	389	0.07	7.82	0	0	6.6
2057	-0.1000	0.0248	-0.1000	-0.1000	0.0341	0.0378	-0.1000	1.9	-0.1000	276.76	-0.1000	1,013	0.08	7.48	0	0	21.0
2058	-0.1000	-0.1000	-0.1000	-0.1000	0.0326	0.0743	0.0479	1.2	-0.1000	83.12	-0.1000	575	0.18	7.55	0	0	0.8
2183	-0.1000	0.0227	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	368.12	-0.1000	1,123	-0.10	7.82	1	0	27.7
2184	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.0757	0.2227	25.9	-0.1000	1306.43	1.4425	5,526	-0.10	7.24	1	0	69.4
2346	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.7	-0.1000	101.41	-0.1000	399	-0.10	7.90	0	0	6.2
2347	-0.1000	0.1189	-0.1000	-0.1000	-0.1000	0.0293	-0.1000	1.5	-0.1000	13.29	-0.1000	503	-0.10	8.02	0	0	7.0
2348	-0.1000	0.0377	-0.1000	-0.1000	-0.1000	0.0366	-0.1000	-0.1	-0.1000	44.24	-0.1000	481	0.15	8.02	0	0	6.8
2349	-0.1000	0.0279	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1	-0.1000	72.61	-0.1000	658	-0.10	7.90	1	0	9.5
2350	-0.1000	0.0400	-0.1000	-0.1000	-0.1000	0.0263	-0.1000	0.1	-0.1000	45.15	-0.1000	469	-0.10	8.10	0	0	6.8
2351	-0.1000	0.0310	-0.1000	-0.1000	-0.1000	-0.1000	0.5318	-0.1	-0.1000	148.50	-0.1000	786	0.41	8.45	1	0	7.9
2352	-0.1000	0.0299	-0.1000	-0.1000	-0.1000	0.0921	0.0551	0.1	-0.1000	52.49	-0.1000	485	-0.10	8.13	0	0	7.3

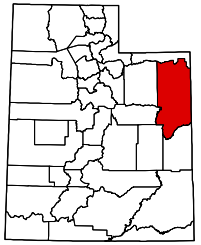
Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

Map 28. Uintah County District



Sample Site
Irrigated Land
Water Body
SCD Boundary
Major Road
Other Road
Water Course
Ditch or Canal

District Location



Map Scale 1:122,854 (1 inch = 1.9 miles)

Zone 7

UACD Zone 7 consists of five districts in four counties: Carbon, Emery, Grand, and San Juan counties.

Eleven sites were sampled in three districts of Zone 7 during the spring, summer, and fall of 2002. These include three sites in the Grand County District and eight in the San Juan County District. A separate narrative report is presented for each district sampled. Each report includes data tables and maps showing approximate locations of sample sites. Each report covers three categories of water quality criteria—irrigation, livestock and culinary. Since water use may overlap among these categories for a single well, analytical results are compared to all three sets of criteria.

Grand County District

Three samples were collected in the Grand County District. Water varies from soft to hard with grains per gallon (gpg) ranging from 2.3 to 7.1 gpg with a mean of 4.92 gpg. Sampled water temperature ranges from 12.4 °C to 17.4 °C, with a mean of 15.13 °C. The pH for the area has a mean of 7.39 and ranges from 7.28 to 7.6.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. Sample 2066 has an EC value of 844 µmhos/cm, greater than the threshold value. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured.

The sodium absorption ratio (SAR) measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. The SAR standard was not exceeded for any samples.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All samples have high bicarbonate, which is common for water in Utah.

No other elements were found in concentrations harmful to plants.

Livestock:

Sample 2065 has elevated molybdenum (Mo). Livestock eating plants irrigated with water that has molybdenum concentration greater than 0.01 ppm may be harmed. High concentrations of molybdenum interfere with copper nutrition in livestock.

No other water quality standards for livestock were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for sample 2066 exceeds the EPA aesthetic standard of 500 ppm with a value of 506 ppm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm μmhos/cm.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables. Coliform bacteria were detected in sample 2067.

Sample Site Test Data for Grand County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2065	-0.1000	52.92	4.39	-0.1000	39.53	13.32	-0.10	7.60	12.4	361
2066	-0.1000	91.22	2.35	-0.1000	29.72	28.33	-0.10	7.28	15.6	506
2067	-0.1000	32.58	0.94	-0.1000	6.20	3.34	-0.10	7.28	17.4	137

Values of -0.1 are below detection limits of testing procedure.

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2065	-0.1000	0.08	9.08	-0.10	-0.1000	0.0320	4.42	-0.1000	-0.1000	0.06	0.3	602
2066	-0.1000	-0.10	31.01	-0.10	-0.1000	-0.1000	3.78	-0.1000	-0.1000	0.07	0.7	844
2067	0.1259	-0.10	-0.10	-0.10	-0.1000	0.0785	1.63	-0.1000	-0.1000	-0.10	0.1	228

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2065	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	0.0103	-0.1000	-0.1000	23.03	-0.1000	361	-0.1000	0.06
2066	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	43.38	-0.1000	506	-0.1000	0.07
2067	0.1259	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	7.77	-0.1000	137	-0.1000	-0.10

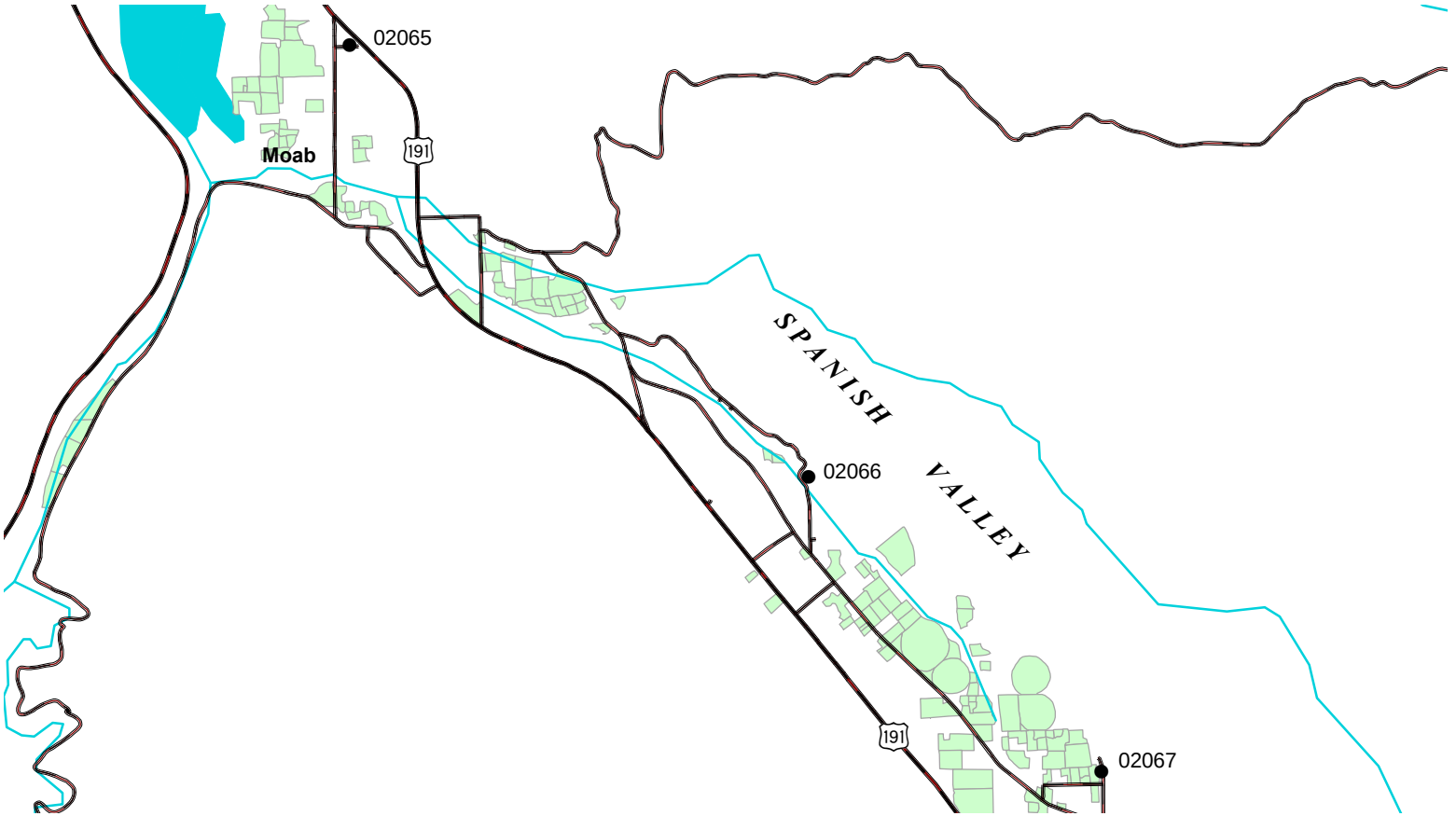
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2065	-0.1000	0.1191	-0.1000	-0.1000	-0.1000	0.0320	-0.1000	1.0	-0.1000	23.03	-0.1000	361	0.06	7.60	0	0	5.4
2066	-0.1000	0.0801	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	8.0	-0.1000	43.38	-0.1000	506	0.07	7.28	0	0	7.1
2067	-0.1000	0.1156	-0.1000	-0.1000	-0.1000	0.0785	-0.1000	0.2	-0.1000	7.77	-0.1000	137	-0.10	7.28	1	0	2.3

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

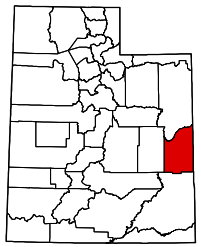
Map 29. Grand County District



Map Scale 1:78,501 (1 inch = 1.24 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



San Juan County District

Water in San Juan County District varies from soft to very hard with grains per gallon (gpg) ranging from 2.9 to 16.0 gpg with a mean of 7.28 gpg. Sampled water temperature ranges from 11.1 °C to 16.4 °C, with a mean of 13.71 °C. The pH for the area has a mean of 7.24 and ranges from 6.5 to 7.56.

Irrigation:

Salinity is a measurement of the concentration of ionic salts dissolved in water. For irrigation water, it is measured as electrical conductivity (EC), in µmhos/cm. Higher conductivity values indicate higher concentrations of dissolved salts. Water high in dissolved salts increases osmotic pressures, making it difficult for plants to get water necessary for growth. Generally when EC exceeds 750 µmhos/cm, salt-sensitive plants begin to be affected. When EC exceeds 3,000 µmhos/cm, most plants would be severely injured. Samples 2068 and 2069 have EC values greater than 750 µmhos/cm.

SAR measures how much sodium (Na) is in solution compared to calcium (Ca) and magnesium (Mg). Excessive sodium in the soil causes soil particles to repel each other. This destroys the structure of the soil, preventing air and water movement. SAR values greater than 3 mark the beginning of problems and values greater than 9 indicate severe problems. No samples exceeded the SAR standard.

Bicarbonate (HCO_3) is an ion that commonly occurs in water solutions. It can be hazardous to plants in excessive amounts, especially when used in sprinkler irrigation. Bicarbonate also causes white deposits on plants and their fruits, which degrades their visual appeal and market value. Bicarbonate also increases the effect of sodium when both are present. Special attention is needed when using water with excessive bicarbonate. With sensitive plants minor problems appear with bicarbonate concentrations in excess of 1.5 meq/l and severe problems appear when it exceeds 8.5 meq/l. All of the samples have high bicarbonate, which is common for water in Utah.

Chlorine, found in the form of chloride (Cl^-), can damage sensitive plants at concentrations above 145 ppm and concentrations exceeding 355 ppm can cause severe damage to almost all plants. Damage increases under sprinkler irrigation and is more severe in windy conditions. Sample 2069 has elevated chlorine.

No other elements were found in concentrations harmful to plants.

Livestock:

No livestock water quality standards were exceeded.

Culinary:

Dissolved salts in water are measured in the field as Electrical Conductivity (EC). Culinary standards, however, are designated as Total Dissolved Solids (TDS), calculated from EC. TDS for samples 2068 and 2069 exceeds the EPA aesthetic standard of 833 µmhos/cm. At this level the water may be off-flavored, but it is not a health problem until TDS reaches 2,000 ppm µmhos/cm.

Sample 2072 has high iron (Fe). This can cause discoloration of plumbing fixtures and promote the growth of iron bacteria, which stain anything they contact. Again, this is an aesthetic issue, not a health concern.

Sample 2068 exceeds the EPA nitrate (NO3) standard of 10 ppm nitrate expressed as nitrogen (NO3-N). NO3 is an important nutrient for plant growth. It is found in nitrogen fertilizers, manure, septic systems, and some minerals. NO3 is toxic to young infants (usually less than 6 months of age) and causes “blue baby syndrome.” NO3 can only be removed from water by reverse osmosis or distillation.

Sample 2069 has high sulfur (S). Sulfate is a soluble form of sulfur that can cause flavor problems in drinking water if there is more than 83 ppm sulfur. Bacteria in the water use sulfur and produce hydrogen sulfide gas (rotten egg gas). The bacteria that produce this compound can live in plumbing fixtures and even hot water heaters. It is not uncommon to get strong odors when the hot water is turned on in areas where there is high sulfate. Generally people cannot tolerate the odor from this gas. Even if the gas is not present high sulfate concentrations can cause diarrhea in people not used to drinking it.

The most serious problem with drinking water from private water systems is bacterial contamination. Because disease-causing organisms are rare, non-parasitic coliform bacteria that are found in association with parasitic bacteria are used as indicators to assess whether water could be contaminated with harmful bacteria. Coliform bacteria can occur naturally in the soil, whereas E. coli, a type of coliform, develops only in the digestive systems of mammals. Presence of coliform bacteria indicates that surface water, soil, or other contaminants are entering the well. Presence of E. coli in well water, on the other hand, indicates that mammalian fecal material is entering the well. Bacterial contamination is commonly the result of well construction problems. Contamination may result from inadequate capping, a leaking well casing, improper grouting, or lack of a casing. E. coli contamination can result from defective septic systems, manure operations or septic systems too close to wells, leaky sewer systems, or shallow water tables.

Samples 2068, 2069, and 2072 are contaminated with coliform. No samples were contaminated with E. coli.

Sample Site Test Data for San Juan County District

General

Id #	Be	Ca	K	Li	Mg	Na	P	pH	°C	TDS
2068	-0.1000	149.26	3.14	0.0731	64.50	67.64	-0.10	6.95	15.6	826
2069	-0.1000	232.33	2.55	-0.1000	40.72	98.06	-0.10	6.50	16.4	1062
2070	-0.1000	42.35	1.81	-0.1000	6.48	15.11	-0.10	7.56	16.4	198
2071	-0.1000	75.84	1.35	-0.1000	14.04	18.49	-0.10	7.41	14.1	342
2072	-0.1000	70.31	1.21	-0.1000	12.36	20.15	-0.10	7.30	11.6	301
2073	-0.1000	87.33	1.52	-0.1000	20.82	32.18	-0.10	7.28	11.8	415
2074	-0.1000	71.99	1.39	-0.1000	15.36	15.63	-0.10	7.35	11.1	306
2075	-0.1000	73.70	1.81	-0.1000	18.01	17.34	-0.10	7.54	12.7	331

Values of -0.1 are below detection limits of testing procedure

Irrigation

Id #	Al	B	Cl	CO3 meq/l	Cu	Fe	HCO3 meq/l	Mn	Se	Zn	SAR	EC umhos/cm
2068	-0.1000	0.18	84.16	-0.10	-0.1000	-0.1000	5.78	-0.1000	-0.1000	0.06	1.2	1,377
2069	-0.1000	0.10	180.83	-0.10	-0.1000	0.0241	6.19	-0.1000	-0.1000	0.06	1.6	1,770
2070	-0.1000	-0.10	-0.10	-0.10	0.0563	0.0884	2.29	-0.1000	-0.1000	0.07	0.6	330
2071	-0.1000	-0.10	8.22	-0.10	-0.1000	0.1254	2.77	-0.1000	-0.1000	0.70	0.5	570
2072	-0.1000	-0.10	4.00	-0.10	-0.1000	0.4054	4.07	-0.1000	-0.1000	-0.10	0.6	502
2073	-0.1000	0.08	14.79	-0.10	-0.1000	-0.1000	4.23	-0.1000	-0.1000	-0.10	0.8	691
2074	-0.1000	-0.10	4.98	-0.10	0.0218	0.0282	3.69	-0.1000	-0.1000	0.05	0.4	510
2075	0.0990	-0.10	9.50	-0.10	-0.1000	0.0586	3.12	-0.1000	-0.1000	0.34	0.5	552

Underlined values exceed irrigation standards. Shaded values indicate severe risks. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Sample Site Test Data for San Juan County District

Livestock

Id #	Al	As	B	Cd	Co	Cr	Mo	Ni	Pb	S	Se	TDS PPM	V	Zn
2068	-0.1000	-0.1000	0.18	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	64.62	-0.1000	826	-0.1000	0.06
2069	-0.1000	-0.1000	0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	130.50	-0.1000	1,062	-0.1000	0.06
2070	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	11.67	-0.1000	198	-0.1000	0.07
2071	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	41.94	-0.1000	342	-0.1000	0.70
2072	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	16.10	-0.1000	301	-0.1000	-0.10
2073	-0.1000	-0.1000	0.08	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	42.08	-0.1000	415	-0.1000	-0.10
2074	-0.1000	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	22.39	-0.1000	306	-0.1000	0.05
2075	0.0990	-0.1000	-0.10	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	41.26	-0.1000	331	-0.1000	0.34

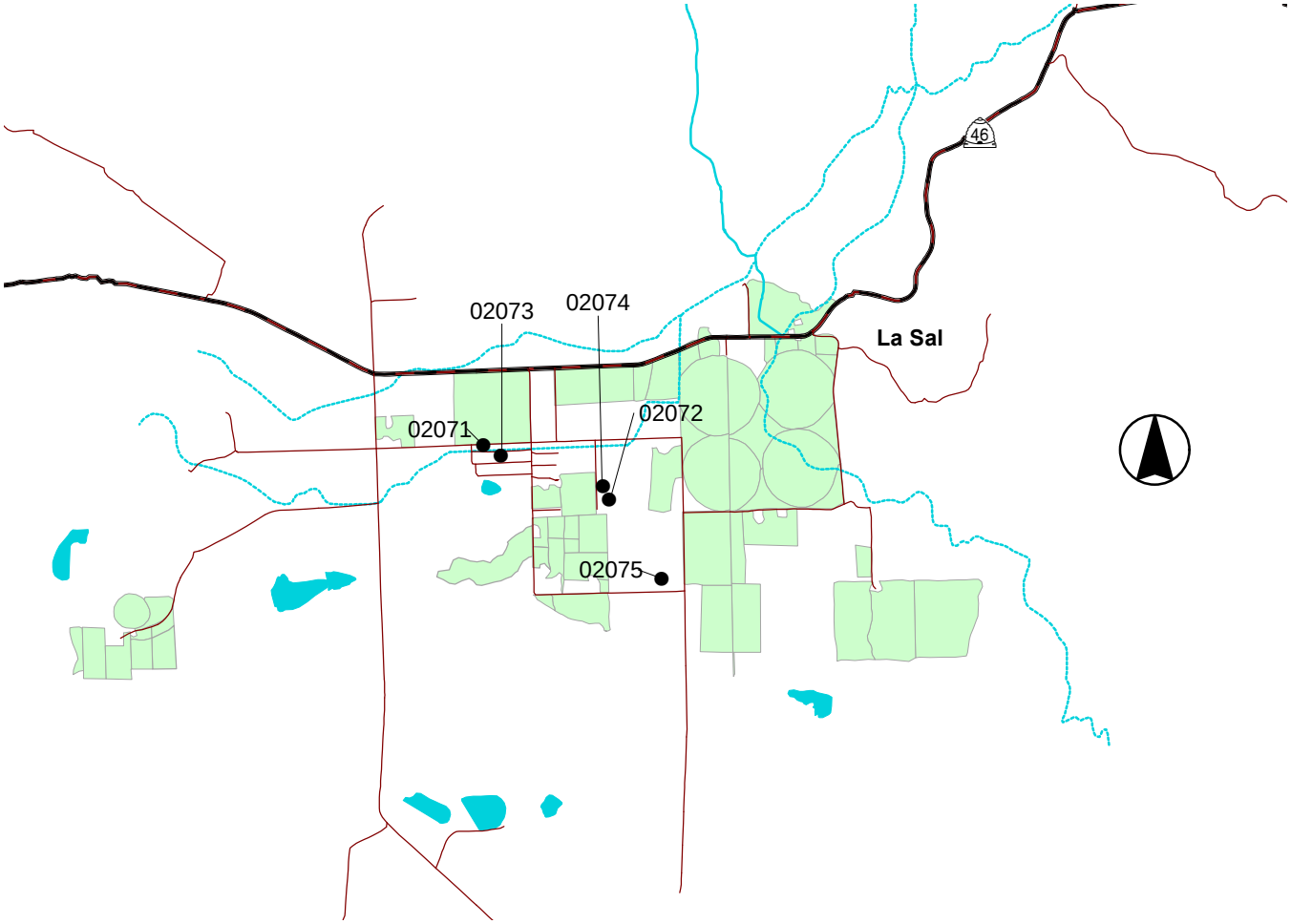
Underlined values indicate minor health problems (particularly smaller and younger animals). Shaded values indicate a serious health risk. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure.

Culinary

Id #	As	Ba	Cd	Cr	Cu	Fe	Mn	NO3-N	Pb	S	Se	TDS PPM	Zn	pH	Col	Ecoli	Hardness gpg
2068	-0.1000	0.1521	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	10.2	-0.1000	64.62	-0.1000	826	0.06	6.95	1	0	12.5
2069	-0.1000	0.1178	-0.1000	-0.1000	-0.1000	0.0241	-0.1000	7.6	-0.1000	130.50	-0.1000	1,062	0.06	6.50	1	0	16.0
2070	-0.1000	0.1219	-0.1000	-0.1000	0.0563	0.0884	-0.1000	0.5	-0.1000	11.67	-0.1000	198	0.07	7.56	0	0	2.9
2071	-0.1000	0.0355	-0.1000	-0.1000	-0.1000	0.1254	-0.1000	1.0	-0.1000	41.94	-0.1000	342	0.70	7.41	0	0	5.3
2072	-0.1000	0.0832	-0.1000	-0.1000	-0.1000	0.4054	-0.1000	0.9	-0.1000	16.10	-0.1000	301	-0.10	7.30	1	0	4.8
2073	-0.1000	0.0352	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	1.8	-0.1000	42.08	-0.1000	415	-0.10	7.28	0	0	6.3
2074	-0.1000	0.0462	-0.1000	-0.1000	0.0218	0.0282	-0.1000	1.5	-0.1000	22.39	-0.1000	306	0.05	7.35	0	0	5.1
2075	-0.1000	0.0335	-0.1000	-0.1000	-0.1000	0.0586	-0.1000	0.7	-0.1000	41.26	-0.1000	331	0.34	7.54	0	0	5.4

Underlined values exceed Secondary (aesthetic) standards. Shaded values exceed Primary (health) standards. All values are mg/l unless labeled differently. Values of -0.1 are below detection limits of testing procedure. For Col and Ecoli 1 = present 0 =absent.

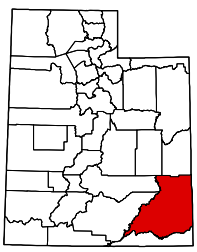
Map 30. San Juan County District, North Section



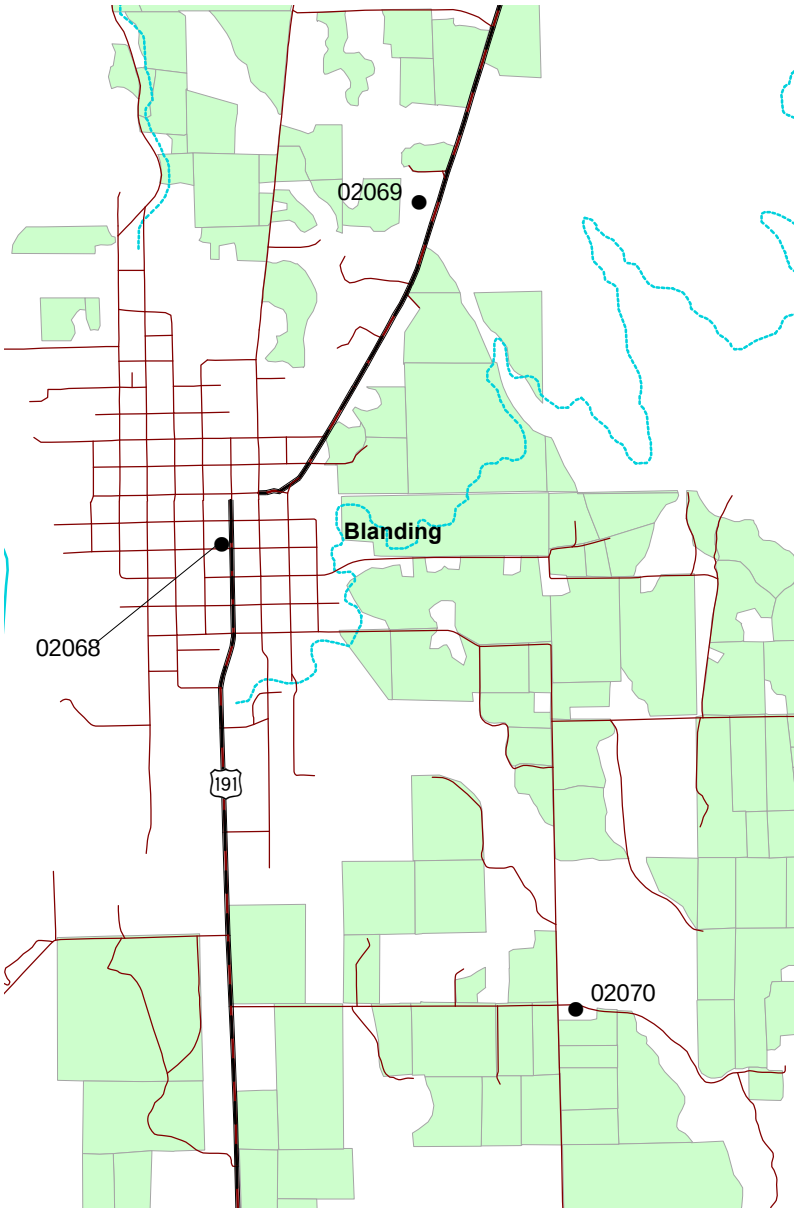
Map Scale 1:77,554 (1 inch = 1.2 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location



Map 31. San Juan County District, South Section



Map Scale 1:42,726 (1 inch = 0.67 miles)

- Sample Site
- Irrigated Land
- Water Body
- SCD Boundary
- Major Road
- Other Road
- Water Course
- Ditch or Canal

District Location